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ABSTRACT

This report presents an analysis of data obtained from the Missouri Education Assessment project conducted during the school year 1970-71. It was found that elementary education in Missouri compares very favorably with the national norm. Grades four and six were selected to represent elementary education. Schools were randomly selected within the parameters of district classification and relative size of the district. Assessment data were based on The Comprehensive Tests of Basic Skills and the Short Form Test of Academic Achievement. Four curricular areas were investigated: reading, language, mathematics, and study skills. Data analysis was conducted from within three contexts: (1) achievement of Missouri elementary students relative to established norms; (2) obtained student achievement relative to anticipated achievement; and (3) the relationships between achievement and selected variables such as test scores and educational and demographic characteristics related to the sample schools and districts. Results of the study are analyzed and presented in tables and graphs, and possible problem areas are identified. (Author/DI)

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MISSOURI ELEMENTARY EDUCATION

AN ASSESSMENT OF FOURTH AND SIXTH GRADE

BASIC SKILLS - 1971

Prepared for Missouri State Department of Education

by CTB/McGraw-Hill

Department of Programs and Services

ABSTRACT

This report presents an analysis of the data obtained during the performance of the Missouri Elementary Education Assessment project conducted by CTB/McGraw-Hill for the Missouri State Department of Education during the school year 1970-71. The results of this assessment indicate that, on the whole, the status of elementary education in Missouri compares very favorably with the national norm.

Grades 4 and 6 were selected to represent elementary education. Schools were randomly selected within two parameters: 1) district classification (A, AA, and AAA), and 2) the relative size (large, medium or small) of the district within each classification. The design of the study stipulated a sample size of 8 per cent of the Missouri elementary schools, and 10 per cent of the fourth and sixth graders enrolled in those schools. Actual sample size very closely approximated these criteria.

Data for this assessment were derived from two instruments: the *Comprehensive Tests of Basic Skills (CTBS)*, and the *Short Form Test of Academic Achievement (SFTAA)*, which were administered concurrently. Four major curricular areas were investigated: Reading, Language, Mathematics, and Study Skills. Data analysis was conducted from within three contexts: 1) the achievement of Missouri elementary students relative to established national norms, 2) the obtained achievement of Missouri elementary students relative to their anticipated achievement (an expectancy concept related to several individual characteristics, such as age, grade, sex, and intelligence), and 3) the relationships between achievement and selected variables. These variables included student test scores, and educational and demographic characteristics related to the sample schools and districts. Certain limitations due to the character of the data and instruments are described.

Student vs. norm performance comparisons are presented by grade equivalent units and percentile rank. Tables and bar graphs are used to present student obtained achievement vs. anticipated achievement with emphasis given to achievement significantly *above* or *below* that anticipated. Possible needs or problem areas are identified. An analysis of the relationships of variables to school mean achievement is presented in a table of correlation coefficients. Obtained vs. anticipated achievement is discussed for each level of school variables, and significant departures from the norm in the *above* and *below* categories are noted.

This study complements a similar study of secondary education in Missouri which was conducted during the school year 1969-70.

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SECTION I

INTRODUCTION

SECTION 1 - INTRODUCTION

The Missouri State Department of Education (SDE) plays a vital role in the development, support and regulation of educational programs in the state. The broad scope and complexity of SDE's commitments require a periodic definitive assessment of the status (strengths, weaknesses, problem areas, etc.,) of Missouri educational programs. This document reports the results of the Missouri Elementary Education Assessment project conducted by CTB/McGraw-Hill for the school year 1970-71. This study complements the 1969-70 study of secondary education and, therefore, completes a statewide perspective of education in Missouri.

The purposes of this project were: 1) to identify those educational factors which are subject to impact by SDE funding or regulation and which require attention to improve educational opportunities for Missouri students and 2) to ascertain the status of Reading, Language, Mathematics, and Study Skills in the elementary schools of the state as recorded by sampling fourth- and sixth-grade students in selected school buildings.

Allocation of categorical funds (state or federal) to support innovative exemplary programs is an important contribution of the SDE to the improvement of education at the local level. To assure the greatest program benefits, in terms of educational achievement at the local level, SDE must have answers to a variety of pertinent questions. For example: What are the characteristics of the districts that need concentrated effort and funding to remedy low achievement? To what degree do these districts need such concentrated support? In what academic areas is support needed? This assessment of elementary education in Missouri provides data to assist in answering these and other similar questions and, thus, give substance to the decision-making functions of the SDE.

The status of elementary education in intermediate grades of Missouri is examined by a comparison to national achievement norms and by a comparison to achievement potential of individual Missouri students. The relationships between school characteristics variables and school achievement are also examined.

This document is divided into four parts. The first is this introductory section. Section II describes the design of the study; Section III presents an analysis of collected data; and Section IV presents an analysis of the school characteristics variables and their relationships to school achievement.

CTB/McGraw-Hill certifies that it has performed the analysis of data relating to 1) independent variables (as set forth by the Missouri State Department of Education) and 2) the dependent variables of test and subtest scores (derived from administration of the CTBS and SFTAA) in accordance with the terms of the contract dated 25 January 1971. CTB/McGraw-Hill assumes no responsibility for any findings, conclusions, or interpretations other than those set forth in this report.

SECTION II

DESIGN OF THE STUDY

SECTION II - DESIGN OF THE STUDY

BACKGROUND

The *Comprehensive Tests of Basic Skills* (CTBS) was chosen as the instrument with which to make this assessment. The CTBS gives particular emphasis to the intellectual processes involved in the solution of problems in the basic skills.

Special interest in anticipated achievement, an expectancy concept related to several individual characteristics (such as age, grade, sex, and intelligence), led to selection of the *Short Form Test of Academic Aptitude* (SFTAA) for concurrent administration with the CTBS. Dual standardization of the CTBS and the SFTAA has made it possible to identify students whose measured achievement is above, at, or below his anticipated achievement.

Anticipated achievement scores are expectancy scores that are expressed, for the purpose of this study, in Anticipated Achievement Grade Equivalent (AAGE) units. A student's anticipated achievement is interpreted as the mean achievement performance of a nationwide sample of students who have characteristics like his (i.e., the same age, grade, sex, and scores on SFTAA). An AAGE was obtained for each test in the CTBS battery and for each skills area total (Reading, Arithmetic, Language, and Study Skills). The difference between a student's obtained score and anticipated score on any test is an estimate of the measure of his achievement *above* and *below* the nationwide average of students with characteristics like his.

Three approaches were considered sufficient to give a comprehensive assessment of the status of elementary education in Missouri.

1. Analyze the achievement of Missouri elementary students relative to the established national norms for CTBS.
2. Analyze the achievement of Missouri elementary students relative to their anticipated achievement.
3. Analyze the relationships between the achievement measures (subtests of CTBS) and other variables (such as demographic and educational characteristics).

Grades 4 and 6 were chosen to represent elementary education. Grade 4 is typically the transitional stage in the instructional process between primary and intermediate education and was considered an appropriate midpoint for measurement. Grade 6, of course, is typically the terminal grade for elementary schools. An incidental factor in grade selection was the broad norming range of the chosen instrument (CTBS) that made it possible to test both grades with the same level of the test.

PROCEDURES

The Missouri Elementary Education Assessment project was announced to Missouri educators and the public by the Missouri State Department of Education. Districts were invited to participate, were fully apprised of the need for thorough representation of the state, and were carefully prepared for the degree of involvement that participation would incur.

CTB/McGraw-Hill was provided with a card deck containing a card for each Missouri school in which instruction was provided for either Grade 4 or Grade 6, or for both grades. Each card contained the Missouri school code, school classification, district enrollment, school enrollment in Grade 4, and school enrollment in Grade 6.

Unclassified schools and schools in which the enrollment was less than 15 students for either Grade 4 or Grade 6 were excluded from the population for that grade. Within each district classification (A, AA, AAA), schools were ordered by size of district. Each ordered listing of schools was divided into three groups, each group representing one-third of the enrolled student population in that district classification. Thus the schools from which the sample was to be drawn were in groups which represented "large," "medium," and "small" districts in each classification. Schools were randomly selected from each group until the sample contained 10% of the students enrolled in that group *and* 8% of the schools in that group. Somewhat more than 10% of the students were ultimately included in the sample due to differences in the Grade 4 and Grade 6 enrollment in the schools selected. Selection continued until at least 10% of the students in each grade were included in the sample.

District administrators were then notified by the Missouri SDE that certain schools in their district had been selected. Extenuating circumstances made it necessary for some schools to withdraw and alternate schools were selected to maintain the sampling structure. After a thorough review of the sample by SDE personnel, it was determined that those schools who withdrew did not affect the representativeness of the sample.

Each district confirmed, by letter to the SDE, participation in the assessment by those schools in the final sample. One person in each district was designated to handle all aspects of the assessment program for the schools in that district. As the Local Education Agency (LEA) contact, this person was responsible for all correspondence, in-district preparation and logistics for testing, completion of the questionnaires, and the return of materials to CTB/McGraw-Hill.

Ten pre-testing workshops were conducted by the CTB/McGraw-Hill evaluation consultant. The first workshop was for SDE personnel. Subsequent workshops were held at conveniently located centers throughout the state for all LEA contacts and other local personnel who were either actually to administer tests or to train others to do so. Each workshop covered, in detail, all aspects of the program, including checking materials received, administering the tests, completing the questionnaire, and packaging materials properly for transmittal to CTB/McGraw-Hill. Emergency and back-up procedures were also carefully drawn to cover any unexpected situations.

SELECTION OF THE SAMPLE

Several factors were considered carefully before reaching the decision to use individual school buildings as the sampling unit. Among these factors were: 1) imposition upon student and faculties in obtaining the sample; 2) the in-school problems associated with testing only a portion of the students enrolled in a grade; and 3) the need to examine school or district related variables upon which credible data were available. Adequate representation of Missouri elementary education was not possible by a whole district sampling within the funds available for the assessment.

Schools were randomly selected, for each grade, within two parameters: 1) district classification and 2) relative size of district within classification. The student population, in each grade, was segmented into thirds in each of the A, AA, and AAA classifications after listing the schools in order, large to small, by district size.

DESCRIPTION OF THE SAMPLE

The distributions of schools and students in the Grade 4 and Grade 6 populations and sample are presented, by district size and classification, in Tables II-1, II-2, and II-3. Sampling based upon September 15, 1970 data came remarkably close to the desired percentages in each cell (10% of total students and 8% of total schools).

Table II-1

TOTAL STUDENT ENROLLMENT BY
DISTRICT SIZE AND CLASSIFICATION
GRADES 4 AND 6

DISTRICT SIZE	DISTRICT CLASSIFICATION AAA	AA	A
Large	19,853 and above	1,494 and above	840 and above
Medium	5,953 to 19,852	901 to 1,493	491 to 839
Small	5,952 and below	900 and below	490 and below

Table II-2

GRADE 4 DISTRIBUTIONS OF SCHOOLS AND
STUDENTS IN THE POPULATION AND SAMPLE, BY DISTRICT
SIZE AND CLASSIFICATION

DISTRICT SIZE		DISTRICT CLASSIFICATION								
		AAA			AA			A		
		Pop. *	Sample **	Pct.***	Pop.	Sample	Pct.	Pop.	Sample	Pct.
Large	Schools	305	28	9.2%	42	3	7.1%	56	5	8.9%
	Students	20,721	2,327	11.4%	2,869	334	11.7%	2,495	321	12.9%
Medium	Schools	274	27	9.9%	56	5	8.9%	89	10	11.2%
	Students	21,169	2,075	9.8%	2,702	370	13.7%	3,579	432	11.4%
Small	Schools	305	26	8.5%	71	6	8.5%	174	18	10.3%
	Students	20,219	2,120	10.5%	2,666	271	10.1%	3,937	445	11.3%
TOTAL	Schools	896	81	9.5%	170	14	8.2%	237	33	13.9%
	Students	62,109	6,522	10.5%	8,237	975	11.9%	10,011	1,198	11.9%

* Total number of Grade 4 schools/students in the state
** Number of Grade 4 schools/students in the sample
*** Percentage of state total schools/students incorporated in the sample

Table II-3

GRADE 6 DISTRIBUTIONS OF SCHOOLS AND STUDENTS IN THE POPULATION AND SAMPLE, BY DISTRICT SIZE AND CLASSIFICATION

DISTRICT SIZE		DISTRICT CLASSIFICATION								
		AAA			AA			A		
		Pop.*	Sample**	Pct.***	Pop.	Sample	Pct.	Pop.	Sample	Pct.
Large	Schools	305	25	8.2%	42	3	7.1%	56	5	8.9%
	Students	20,043	2,231	10.9%	2,818	326	11.6%	2,535	325	12.8%
Medium	Schools	274	24	8.7%	56	6	10.7%	89	10	11.2%
	Students	20,855	2,374	11.0%	2,538	417	16.5%	3,529	451	12.8%
Small	Schools	305	23	7.5%	71	7	9.9%	174	18	10.3%
	Students	19,081	1,960	10.3%	2,600	365	14.0%	3,831	476	12.4%
TOTAL	Schools	896	72	8.0%	170	16	9.4%	237	33	13.9%
	Students	59,979	6,565	11.0%	7,956	1,108	13.9%	9,895	1,252	12.7%

* Total number of Grade 6 schools/students in the state
** Number of Grade 6 schools/students in the sample
*** Percentage of state total schools/students incorporated in the sample

VARIABLES STUDIED

Data obtained from the administration of the *Comprehensive Tests of Basic Skills* (CTBS), Level 2, and the *Short Form Test of Academic Aptitude*, (SFTAA), Levels 2 and 3 for Grades 4 and 6, respectively, provided 4 dependent and 3 independent variables.

Dependent Variables

Dependent variables data were the 4 subscores of each individual student on the CTBS:

1. Reading Vocabulary
2. Reading Comprehension
3. Reading TOTAL
4. Language Mechanics
5. Language Expression
6. Language Spelling
7. Language TOTAL
8. Arithmetic Computation
9. Arithmetic Concepts
10. Arithmetic Applications
11. Arithmetic TOTAL
12. Study Skills, Reference Materials
13. Study Skills, Graphic Materials
14. Study Skills TOTAL

Independent Variables (SFTAA)

Three independent variables were derived from individual student scores on the SFTAA:

1. Language IQ
2. Non-Language IQ
3. Total IQ

These three independent variables were used only in the determination of anticipated achievement and, thus, in the derivation of the distribution of students whose measured achievement was above, at, or below anticipated achievement.

Independent Variables (SDE)

Other independent variables included demographic and educational characteristics related to the schools and districts included in the sample. Data on 12 variables were supplied by the Missouri SDE from its files. These data were based upon figures obtained by the SDE in September, 1970:

1. District Classification

AAA, AA, and A classifications are applied to school districts depending upon the type of program offered. "AAA" school districts offer, for example, broader instructional programs, more teachers with Master's degrees, and more extensive auxiliary services than "A" school districts.

2. District Enrollment

District enrollment as reported on September 15, 1970.

3. School Enrollment

School enrollment as reported on September 15, 1970.

4-9. Teacher Qualifications

For each school, the SDE reported the number of teachers whose earned degree and number of years of experience could be categorized as follows:

BA, with 1-3 years of experience
BA, with 4-7 years of experience
BA, with more than 7 years of experience
MA, with 1-3 years of experience
MA, with 4-7 years of experience
MA, with more than 7 years of experience

These six items of teacher qualifications data were converted to a single teacher qualification index by assigning to each individual teacher a qualification weight as shown in Table II-4.

Table II-4

TEACHER QUALIFICATIONS WEIGHTS
BY EARNED DEGREE AND YEARS OF EXPERIENCE

EARNED DEGREE	YEARS OF EXPERIENCE		
	1 - 3	4 - 7	over 7
BA	1	2	3
MA	2	3	4

Each school was given a single teacher qualification index derived as the mean of the teacher qualifications weights for all teachers in the school. The index, therefore, had a range from 1.0 to 4.0.

10. Student-Teacher Ratio

This was derived as the ratio of the number of students enrolled in the school to the number of teachers assigned a full-time teaching load with one group of students.

11. Adjusted Valuation per Student

This was derived for a given district by use of a percentage index provided by the Department of Revenue, State of Missouri. If assessed valuation varied from 30% of assessed real value, the dollar figure was adjusted to correspond to 30% of assessed real value. Dividing this adjusted figure by district enrollment provided the adjusted valuation per student.

12. Expenditure per Student

Expenditures include the total district cost for administration, instruction, attendance services, health services, student transportation services, operation of plant, maintenance of plant, and fixed charges. Expenditure per student is this total divided by the number of students in average daily attendance.

Independent Variables (Questionnaires)

Data on 25 independent variables were obtained on questionnaires (see Appendix A) completed by a designated local representative for each district in which a school was part of the sample. All data obtained on the questionnaire were related to the school building in the sample, not to the district in general.

1. Level of Guidance Services

This was the number of assigned hours per week of guidance service in that school.

2. Level of Health Services

This was the number of assigned hours per week of health service, by the school nurse, in that school.

3. Level of Library Service

This was the number of hours per week that a certificated librarian was assigned in that school.

4. Level of Audio-Visual Service

This was the number of hours per week that a staff member was assigned to provide A-V service in that school.

5. Level of Social Worker Service

This is a binary notation indicating whether or not a certificated social worker was available to that school.

6. Level of Psychological Services

This is a binary notation indicating whether or not psychological service was available to that school.

7. Title I Status

This is a binary notation indicating whether or not that school participated in a Title I program.

8. Special Teacher, Art

For each of variables 8, 9, and 10, a binary notation indicated whether or not the given subject was taught in that school by a teacher specifically certificated to teach that subject.

9. Special Teacher, Music

10. Special Teacher, Physical Education

11. Special Education, EMR

For each of variables 11 and 12, a binary notation indicated whether or not there existed such district-supported special education programs to which that school could send special education students.

12. Special Education, Speech Handicapped

13. Pre-Kindergarten

For each of variables 13 and 14, a binary notation indicated whether or not there existed such district-supported programs which students from that school could attend.

14. Kindergarten

15. Primary - Graded - Self Contained

For each of variables 15 through 18, a binary notation indicated the school organization for instruction at the primary level, Grades 1-3.

16. Primary - Graded - Departmentalized

17. Primary - Non-graded - Self Contained

18. Primary - Non-graded - Departmentalized

19. Intermediate - Graded - Self Contained

For each of variables 19 through 22, a binary notation indicated the school organization for instruction at the intermediate level, Grades 4-6.

20. Intermediate - Graded - Departmentalized

21. Intermediate - Non-graded - Self Contained

22. Intermediate - Non-graded - Departmentalized

23. Level of Administrative Services

This was the number of hours per week a principal was assigned to that school.

24. Certificated Principal

For this variable, a binary notation indicated whether or not the principal of that school was certificated as an elementary school administrator.

25. Assistant Principal

This variable was to indicate the number of hours that an assistant principal was assigned to that building. This was eliminated from the analysis when it was found that only three schools in the sample of 137 had any time assigned for an assistant principal. However, these three schools were included in computation of in-building specialists in Section IV.

LIMITATIONS

Any assessment short of total population testing is subject to some limitations upon the conclusions which may be drawn from the data obtained. Some limitations arise, also, from the character of data and some from characteristics of instruments. While such limitations may be more statistical than real, each must be clearly recognized. Limitations considered pertinent to this assessment project are listed below.

1. No inference to a given district can be drawn from the data obtained from the students in the sample schools of that district. Sample schools were drawn from all districts of like size and classification. Specific school data were reported to each school, but none of the data are identified, by school, in this report. District administrators are cautioned *not* to assume that data from sample schools in their district represent all schools in their district.

2. Test scores may be used for comparison with established norms. Item data are not appropriate, however, for individual diagnostic use.

3. Every effort was made to prepare people in each district and each school to administer the tests properly and uniformly. However, testing in 137 schools indicates at least 137 different testing situations and some degree of variability in test administration is certain.

4. It is highly tempting to infer a cause-and-effect relationship between a dependent and an independent variable having a medium to high correlation. No such inference should be placed upon the data in this assessment. In many cases, there is no logical basis for assuming that any cause-and-effect relationship should exist between two variables, even if there should happen to be a ± 1.00 correlation. Such correlation might better provide an incentive for a carefully controlled study to determine whether or not a cause-and-effect relationship does, in fact, exist.

5. Consideration must be given to the possibility that a slight positive bias may have developed in the anticipated achievement data. This arises from two causes:

   a. Full achievement data and aptitude data are needed for proper determination of the anticipated achievement. Absences caused the loss of some data.

b. Some students were too old for the normative range of SFTAA.

Note that the students who fall into the above categories would generally be those students who are having more scholastic problems than the average. Total loss from these factors was about 250 cases in each grade level.

6. The intent of this document is to present an assessment of the status of elementary education in Missouri rather than to probe the reasons behind that status.

SECTION III

DATA ANALYSIS

SECTION III - DATA ANALYSIS

INTRODUCTION

Data are presented for four major curricular areas: Reading, Mathematics, Language, and Study Skills. For Grades 4 and 6, each major subject area discussion is divided into two parts. The first describes the achievement of the Missouri sample as compared to norm group achievement. The second part discusses differences between obtained and anticipated achievement for the sample. (See Page II-2 for a discussion of anticipated achievement.)

The major unit of measure used in the analysis is the "grade equivalent." Although not precisely linear at Grades 4 and 6, this concept was selected for ease of interpretation in determining where the Missouri students tend to rank on the ladder of achievement in the basic skills.

The primary division for comparative purposes is district classification, A, AA, and AAA. That is, the major questions answered in each phase of the four subject area analyses are: 1) Are there differences in achievement among the three classifications? 2) Are there differences in achievement between the composite sample and the national norm group? 3) Are there differences in achievement between each classification and the national norm group?

It is imperative that, in reviewing the data, the reader guards against over-generalizing the findings. Inferences can be drawn to the total Missouri Grade 4 and 6 populations. However, specific judgements concerning a sample school cannot be arbitrarily extended to another school -- even if that school falls into a similar category or classification. Likewise, considerable study under controlled experimental conditions is required before valid cause-and-effect relationships can be established.

READING

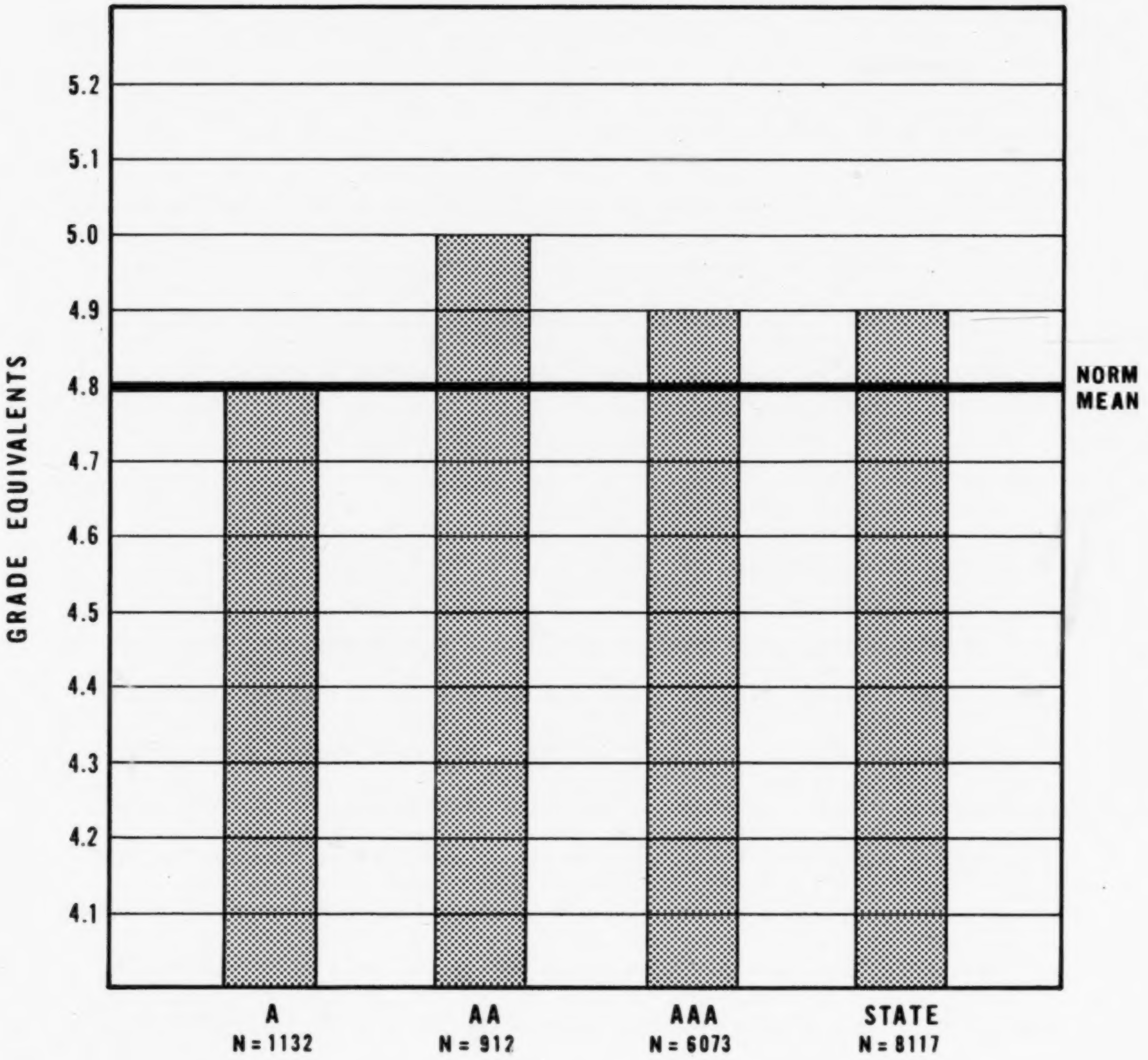
The CTBS Reading Test is divided into two parts: Vocabulary and Comprehension. The Vocabulary section consists of 40 items in which the student indicates his knowledge of the meaning of words in context. The 45-item Comprehension section measures the student's understanding of what he reads. Three scores are reported: Vocabulary, Comprehension, and Reading Total. Test results are discussed below by grade.

Grade 4

Grade Equivalent Comparisons - Missouri vs. Norm

Reading scores were obtained from 8,117 fourth graders. Figure III-1 shows Reading Totals in mean grade equivalents for the three district classifications (A, AA, and AAA) and the state as a whole (a composite of the three classifications). These are plotted against the norm group. This figure shows that there are only minor differences between the three classifications, and that the state as a whole compares favorably with the national normative sample. (One month difference on either side of the norm line, in a practical sense, represents very little difference.)

Reading Totals presented in Figure III-1 are a composite of the Vocabulary and Comprehension scores. Students in the A schools performed equally well on the Vocabulary and Comprehension sections. The AA and AAA schools did slightly better on the Vocabulary section than they did on the Comprehension subtest. In fact, when data from the state as a whole are compared to the norm group, the Missouri students outperformed the norm



(N = Number of students participating)

FIGURE III-1. READING TOTALS VS NORM MEAN (GRADE 4)

group by two months on the Vocabulary section but only equaled the normative performance in Comprehension. Appendix B contains mean and standard deviation subtest information for fourth-grade reading.

(All subsequent data presented for the state as a whole will very closely resemble the AAA schools because AAA students represent over two-thirds of the state sample.)

Grade Equivalent Comparisons By Percentile Rank

Further information on student performance can be obtained by comparing the grade equivalents of the national norm group with those of the Missouri students at various points along the percentile rank scale, which ranges from 1 to 100. In this case, a given percentile rank represents that point on the grade equivalent scale below which a given percentage of students fall. For example, if the 10th percentile score for Reading Total is 2.7, this means that the performance of 10 per cent of the total group scores below 2.7. Therefore, if the distribution of a group is such that a higher grade equivalent at, say, the 10th percentile than that of the normative sample at the same percentile is noted, it is possible to conclude that proportionately fewer students in the entire group scored as low as those in the normative sample. Conversely, if the distribution of a group is such that a lower grade equivalent than that of the normative sample at the same percentile is noted, it is possible to conclude that a proportionately lower number of students in the entire group scored as high at that point as those in the normative sample.

For the Missouri study, comparisons of grade equivalents were made at the 10th, 25th, 50th, 75th, and 90th percentile points.

Figure III-2 shows the grade equivalents for the A, AA, and AAA schools at these same percentile points. These data indicate that proportionately fewer Missouri students (than those in the norm group) scored very low (at or below 2.7) but that Missouri grade equivalents at the 25th percentile closely parallel the norm (3.6). With the exception of the AA students whose distribution placed the middle point at 4.8, the grade equivalent at the 50th percentile for both the norm group and the A and AAA students was the same (4.6). All three classifications in Missouri and the norm group distributed their scores such that the 75th percentile score was 6.0. The point below which 90 per cent of the students ranked was 7.2 for the A, AAA, and norm groups, and 7.4 for the AA students. In summary, the distribution of the norm group and the Missouri students in Reading, very closely resemble each other, except that there are proportionately fewer very low scores in the Missouri group.

Anticipated Achievement Comparisons*

The information presented here relates obtained performance of the Missouri fourth graders in Reading to their expected performance. Student performance was determined from the administration of the *Comprehensive Tests of Basic Skills* (CTBS). Expected performance (anticipated achievement)

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*Some figures presented in this section will not match exactly the figures from the previous section because only students with a complete set of data (i.e., ability and achievement test scores) were included in this sample. Exclusion of incomplete cases, if sufficient, will generally result in slightly more positive trends.

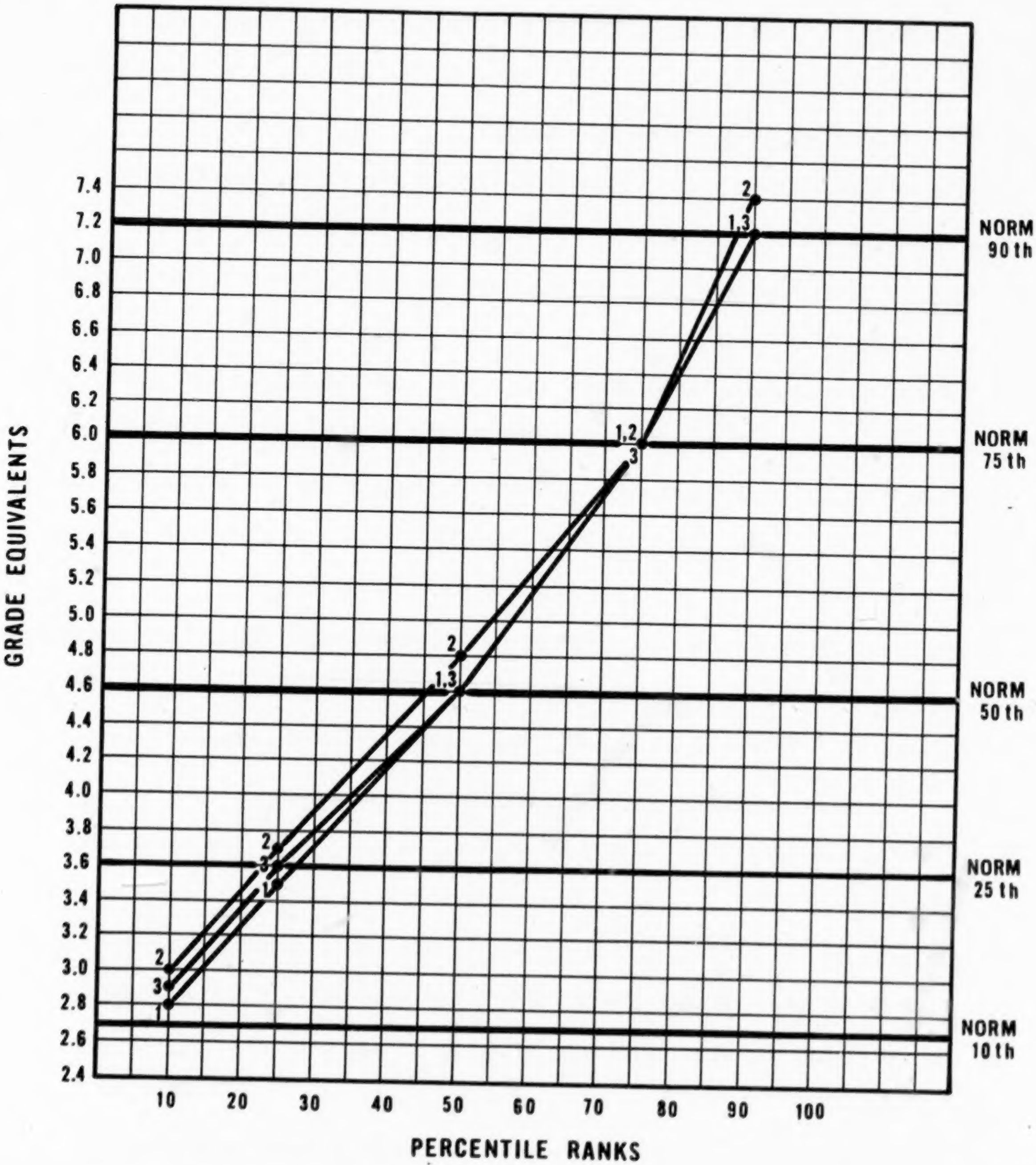


FIGURE III-2. READING TOTAL – CUMULATIVE FREQUENCY DISTRIBUTION (GRADE 4)

was predicted from scores on the *Short Form Test of Academic Aptitude* (SFTAA), along with such information as age, grade, and sex. (See Page II-2 for a discussion of anticipated achievement.)

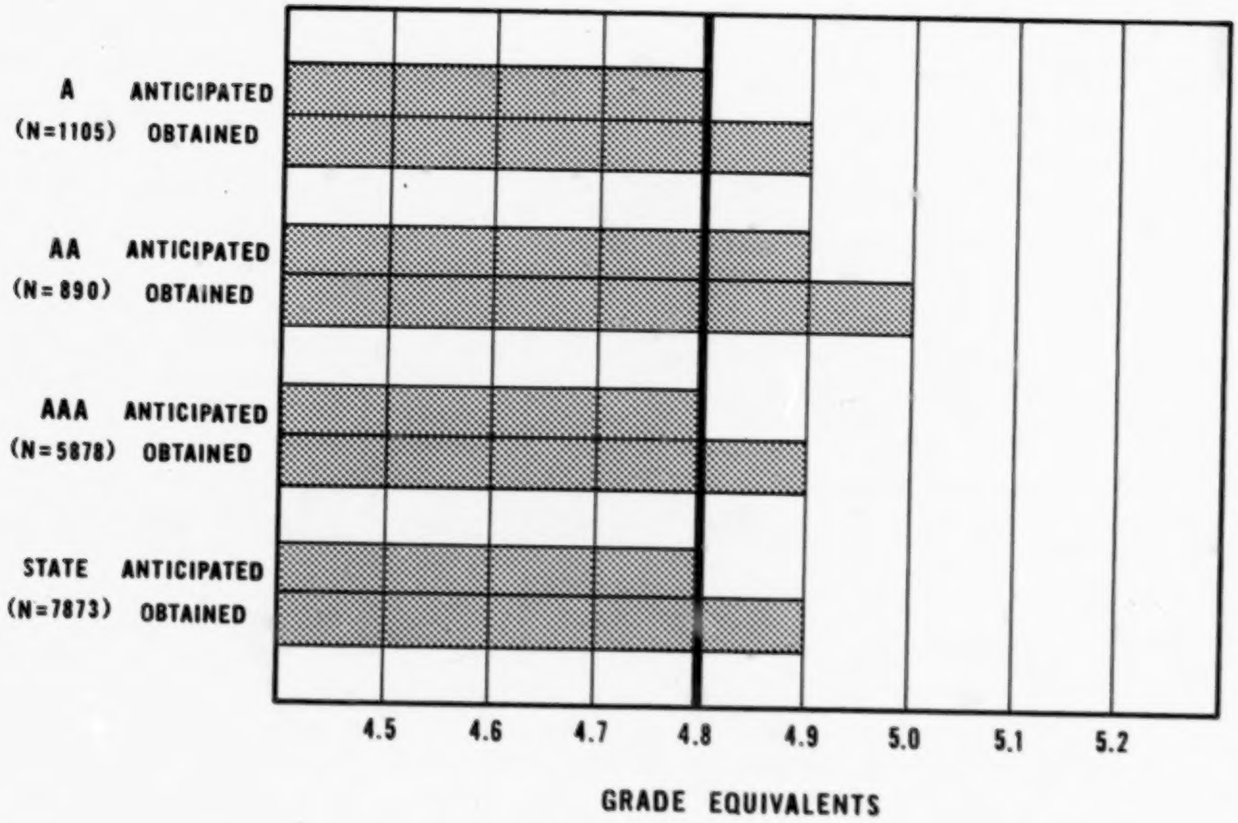
Figure III-3 shows that students in each of the three classifications performed at a level on the average of one month in excess of what was expected of them. Appendix C contains mean anticipated and obtained subtest scores for the Missouri sample.

If the distribution of students who score significantly above and below their anticipated achievement equals that of the norm group, one would expect 10 per cent to score above their expected achievement and 10 per cent to score below. Positive trends result if more than 10 per cent score significantly above and/or less than 10 per cent score significantly below.

In the case of fourth-grade scores on Reading Total, significant strengths appear. In each classification, fewer than 10 per cent scored significantly below their anticipated achievement. The distribution of students scoring above their anticipated achievement equaled the norm group.

The total Reading data basically reflect an average of the Vocabulary and Comprehension distributions. While there is little deviation between the two subtests in the percentages above anticipated achievement, the percentages below for Vocabulary range between 4 and 5 per cent while the ranges below for Comprehension are from 8 per cent (AA) to 11 per cent (A), the total being 10 per cent.

Table III-1 presents this information as well as the total number of Missouri students who would be expected to fall in the above and below



Note: Heavy vertical line represents the mean normative score at the time the Missouri students took the test.

(N = Number of students participating)

FIGURE III-3. ANTICIPATED VS OBTAINED ACHIEVEMENT IN READING (GRADE 4)

categories. By generalizing and extending the sample to the total population, the best estimate is presented of the number of students who would fall into each category if all were to have been tested. Appendix D contains the percentages of Missouri Grade 4 students above, and below, anticipated achievement for the subtests in Reading.

Table III-1

PERCENTAGES AND ESTIMATED NUMBERS OF STUDENTS IN MISSOURI SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 4 -- Reading

	% Above	% Below	No. Mo. Stu.*	Exp.** Above	Actual** Above	Exp.** Below	Actual** Below
A	11	7	10,000	1,000	1,100	1,000	700
AA	10	6	8,200	820	820	820	492
AAA	10	8	62,100	6,210	6,210	6,210	4,968
State	10	8	80,300	8,030	8,030	8,030	6,424
Norm	10	10					

*The figures in this column represent the numbers of Missouri students and are rounded to the nearest 100 from Sept., 1970, information.

**These numbers represent inferences made from the sample to the entire Missouri Grade 4 population utilizing percentages reported in the first two columns.

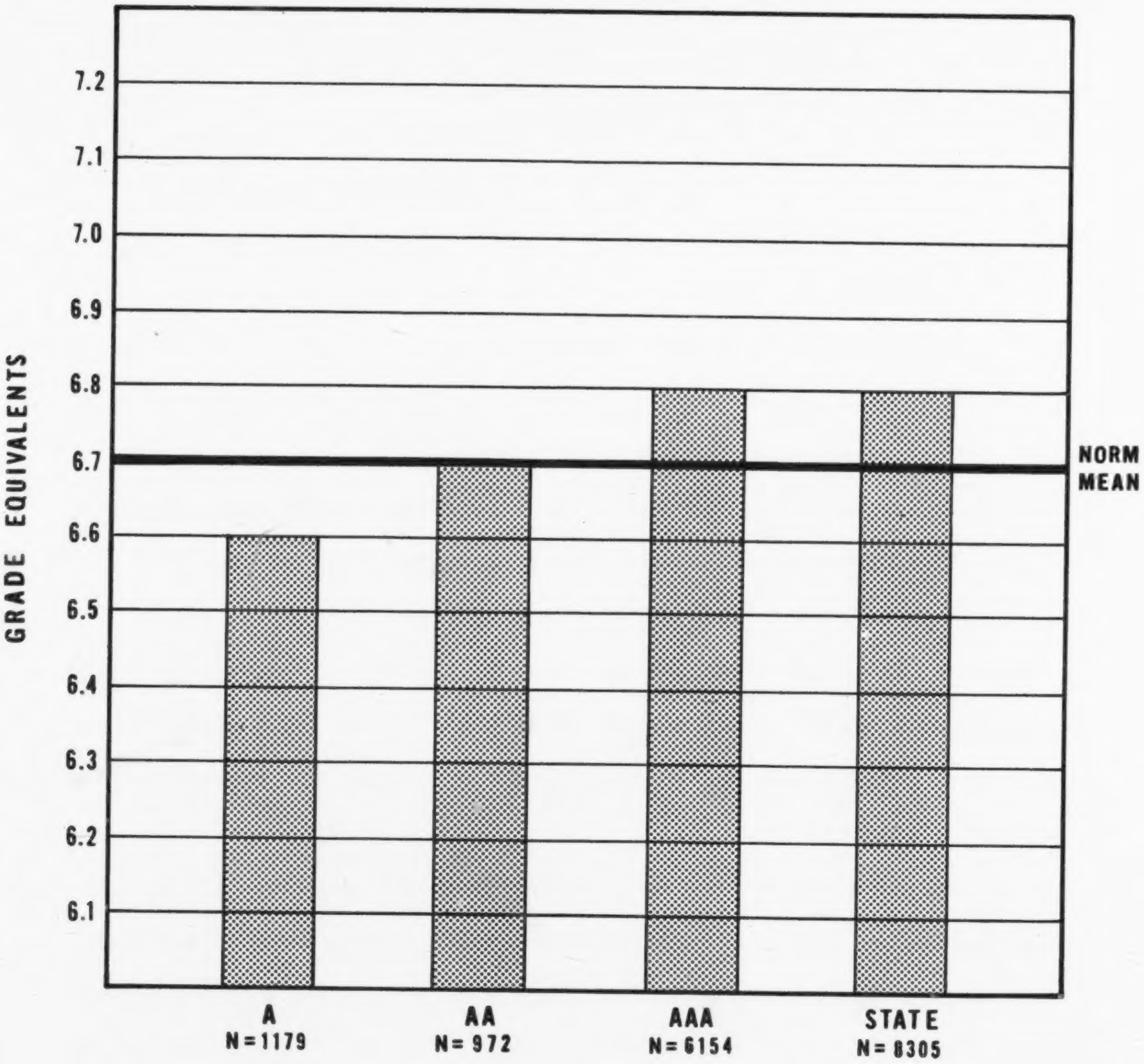
Note: Totals for state will not equal the sum of A, AA, and AAA down the columns; each row is estimated from the whole number percentage figures.

Grade 6

Grade Equivalent Comparisons - Missouri vs. Norm

Reading scores were obtained from 8,035 sixth graders. Figure III-4 shows Reading Totals in mean grade equivalents for the three district classifications (A, AA, AAA), the state as a whole (a composite of the three classifications), and the national norm group. This figure shows that the mean grade equivalent for students in class A schools is one month below the normative mean; for students in AAA schools, one month above the normative mean; and for AA students, equal to the normative mean. However, when considering these differences from a practical point of view, one month difference either side of the norm line represents very little difference. It would appear that in Grade 6, the AAA students, to a minor degree, have a higher achievement level in Reading than the A students. Appendix E contains mean and standard deviation subtest information on sixth-grade Reading.

In obtaining the Reading Total scores presented in Figure III-4, the slight deviation from norm performance for the A students was a two-month below-average performance in Reading Comprehension accompanying performance equal to the norm group in Vocabulary. The AA and AAA students equaled norm performance in Comprehension but each excelled, by two months, norm performance in Vocabulary. For the state as a whole, the Missouri students outperformed the norm group by two months in Vocabulary and equaled the normative performance in Comprehension.



(N= Number of students participating)

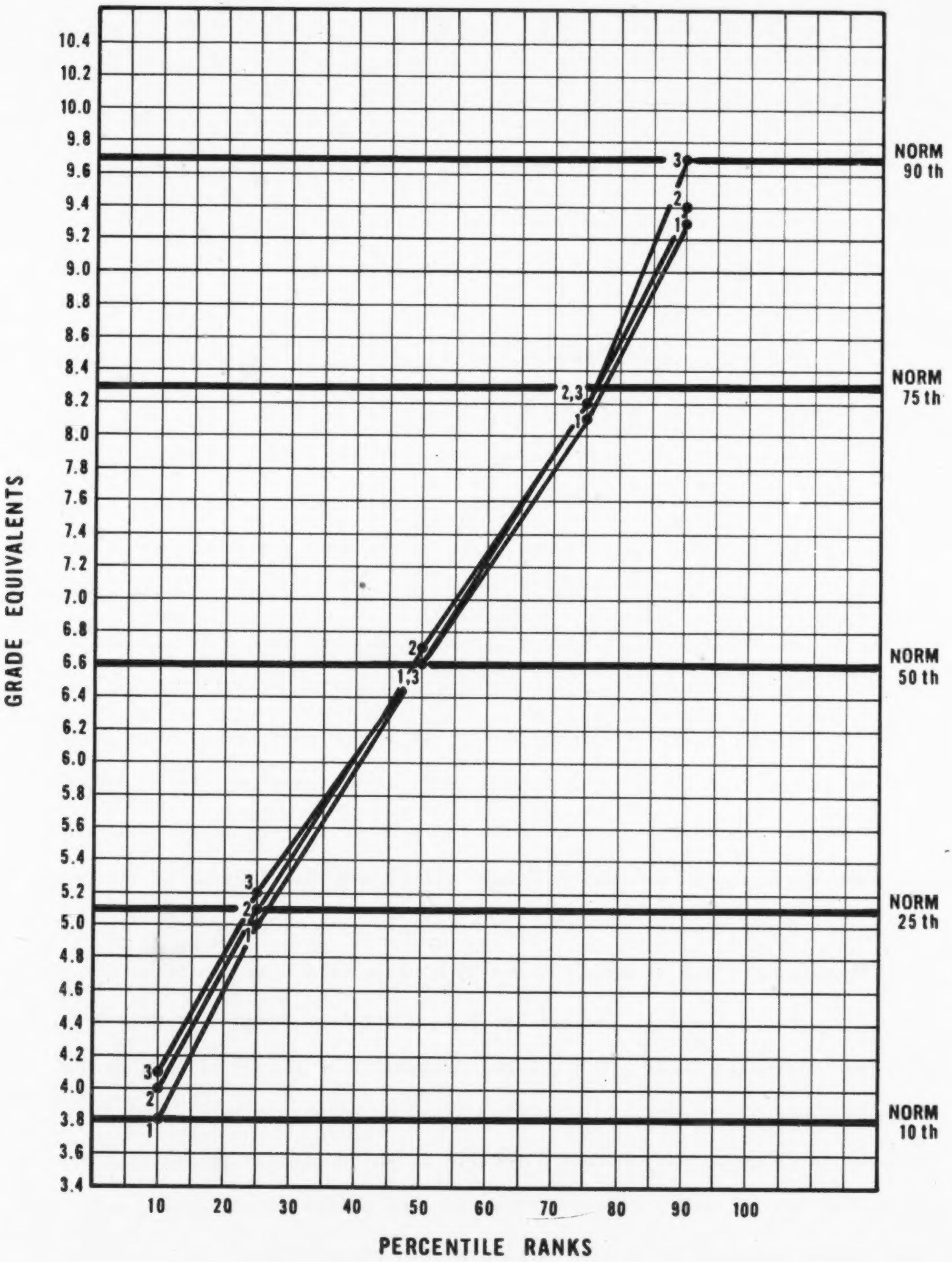
FIGURE III-4. READING TOTALS VS NORM MEAN (GRADE 6)

Grade Equivalent Comparisons By Percentile Rank

Further information on student Reading performance can be obtained by comparing the grade equivalents of the norm group with those of the Missouri students at various points along the percentile rank scale. (See discussion Page III-5.)

Figure III-5 shows the grade equivalents for the A, AA, and AAA schools at the 10th, 25th, 50th, 75th, and 90th percentile points.

It may be noted that, with the exception of the A school category, proportionately fewer numbers of students from Missouri scored as low as those in the norm group. The bottom 10 per cent of the norm group were at or below the grade equivalent of 3.8. The same was true for students in the A schools. For the AA and AAA schools, a student could be as high as 4.0 or 4.1 and still be in the lowest 10 per cent. With the exception of the 50th percentile, the distribution of students in the A schools is not quite up to norm level. In fact, at the 90th percentile, a norm group participant must have scored a 9.7, whereas a student in an A school could be in the top 10 per cent with a 9.3 grade equivalent. As seen in Figure III-5, the distribution of students in the AA and AAA schools very closely parallels that of the norm group, except perhaps for the AA group at the 90th percentile. As was true with the A schools, proportionately fewer (than the norm group) Missouri students performed extremely high. It could be concluded from Figure III-5 that the Missouri Grade 6 students are slightly more homogeneous in Total Reading than was the norm group. Further, the figure shows greater discrepancies between A, AA, and AAA students at the extremes of the distribution, and convergence by all three at the normative 50th percentile.



Note: 1 = A; 2 = AA; 3 = AAA.

FIGURE III-5. READING TOTAL-CUMULATIVE FREQUENCY DISTRIBUTION (GRADE 6)

Anticipated Achievement Comparisons*

The information presented in this section relates obtained achievement of the Missouri sixth graders in Reading to their anticipated achievement. (See Page II-2 for a discussion of anticipated achievement.)

Figure III-6 shows that although the students from the A schools were somewhat behind their AA and AAA counterparts in actual achievement, they performed (on the average) one month ahead of their own anticipated achievement. On the other hand, the AA students obtained Total Reading scores equivalent to norm performance yet (on the average) one month behind what was expected of them. The AAA students also performed above their anticipated achievement by an average of one month. Appendix C contains mean anticipated and obtained subtest scores for the Missouri sample.

If the distribution of students who score significantly above and below their anticipated achievement equals that of the norm group, one would expect 10 per cent to score above their expected achievement and 10 per cent to score below. Positive trends result if more than 10 per cent score significantly above and/or less than 10 per cent score significantly below.

Sixth-grade scores on Reading Total indicate that 3 per cent more A and AAA students scored significantly above anticipated achievement than would be expected. The AA distribution paralleled that of the norm group. One per cent

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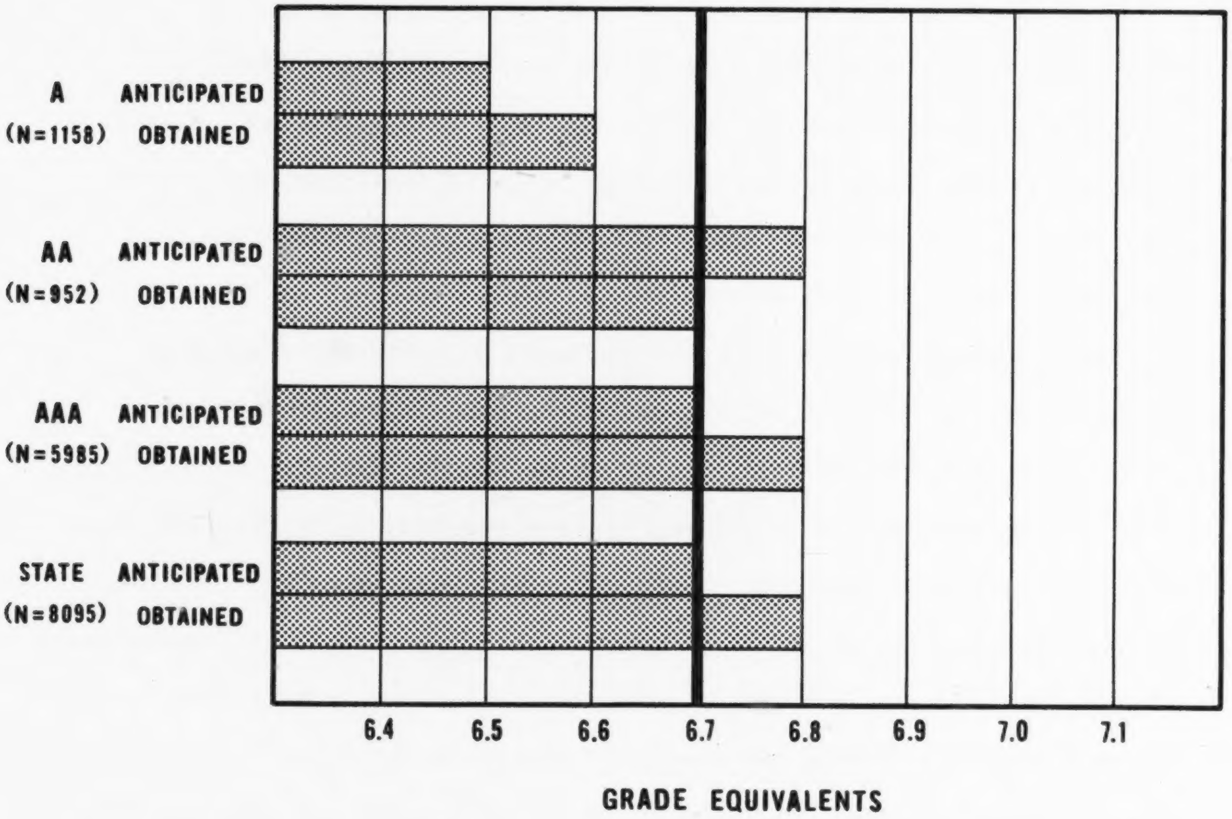
*Some figures presented in this section will not match exactly the figures from the previous section because only students with a complete set of data, i.e., ability and achievement test scores, were included in this sample. Exclusion of incomplete cases, if sufficient, will generally result in slightly more positive trends.



Note: Heavy vertical line represents the mean normative score at the time the Missouri students took the test.

(N = Number of students participating)

FIGURE III-6. ANTICIPATED VS OBTAINED ACHIEVEMENT IN READING (GRADE 6)

more than would be expected from the state scored below their expected level. The students from the A schools (12% below) and AA schools (11% below) contributed slightly more than their share in the "below" category. The data presented above and included in Table III-2 indicate significant strength in the Vocabulary subtest as 15 per cent scored above the expected with those below equaling the distribution from the norm group. However, for the state, 3 per cent more than expected were below their anticipated achievement on the Comprehension subtest.

The total number of Missouri students who would be expected to rank in the above and below categories is also listed in Table III-2. Appendix F contains the percentages of Missouri Grade 6 students above and below anticipated achievement for the subtests in Reading.

Table III-2

PERCENTAGES AND ESTIMATED NUMBERS OF
STUDENTS IN MISSOURI SIGNIFICANTLY ABOVE AND
BELOW ANTICIPATED ACHIEVEMENT

Grade 6 -- Reading

	% Above	% Below	No. Mo. Stu.*	Exp.** Above	Actual** Above	Exp.** Below	Actual** Below
A	13	12	9,900	990	1,287	990	1,188
AA	10	11	8,000	800	800	800	880
AAA	13	10	60,000	6,000	7,800	6,000	6,000
State	12	11	77,900	7,790	9,348	7,790	8,569
Norm	10	10					

*The figures in this column represent the numbers of Missouri students and are rounded to the nearest 100 from Sept., 1970, information.

**These numbers represent inferences made from the sample to the entire Missouri Grade 6 population.

Note: Totals for state will not equal the sum of A, AA, and AAA down the columns; each row is estimated from the whole number percentage figures.

Reading Summary

Data presented for the three classifications in each of Grades 4 and 6 revealed a relatively positive condition throughout the state. Information was presented from within three contexts. The first was to compare the achievement of the Missouri students to that represented by the nationwide normative sample. It was determined that in Grade 4 and Grade 6, the Missouri students tested were, on the average, at a point one month ahead of the norm group. The second method used to present the findings was to compare the achievement of the Missouri students to what would be expected of them, a concept referred to as "anticipated achievement comparisons." It was found that in Grade 4 the average obtained achievement at each classification level (A, AA, AAA) was one month in advance of the anticipated achievement. This was also true for the state as a whole in Grade 6. However, data indicated that the average AA performance failed by one month to attain the average anticipated achievement.

If the distribution of students in Missouri were like that of the norm group, 10 per cent would score significantly above anticipated achievement and 10 per cent would score significantly below. Positive trends would, therefore, be reflected in a Missouri distribution with more than 10 per cent scoring above and/or fewer than 10 per cent scoring below. This was the third means for presenting the data. In the fourth grade, for the state, 10 per cent of the students did, in fact, score significantly above anticipated achievement, but only 8 per cent were significantly below. In the sixth grade, 12 per cent were above, a positive trend, with 11 per cent below--slightly too many but not enough for concern if the criterion for success is favorable comparison with the normative sample. Table III-3 looks at each of the three modes of data presentation by district classification. Emphasis is given to strengths and problems of achievement within each group of students.

Table III-3
SUMMARY OF COMPARISONS

READING

A. Missouri vs. Norm Group Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	0	2	1	1
Grade 6	-1	0	1	1

Note: Differences reported in number of months. Positive differences favor Missouri; negative differences favor the norm group.

B. Missouri Anticipated vs. Obtained Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	1	1	1	1
Grade 6	1	-1	1	1

Note: Differences reported in number of months. Positive differences favor obtained over anticipated; negative differences favor anticipated over obtained.

C. Missouri vs. Norm - Percentages ABOVE Anticipated Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	1	0	0	0
Grade 6	3	0	3	2

Note: Differences reported in percentages. Positive differences favor Missouri; negative differences favor the norm group.

D. Missouri vs. Norm - Percentages BELOW Anticipated Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	3	4	2	2
Grade 6	-2	-1	0	-1

Note: Differences reported in percentages. Positive differences favor Missouri; negative differences favor the norm group.

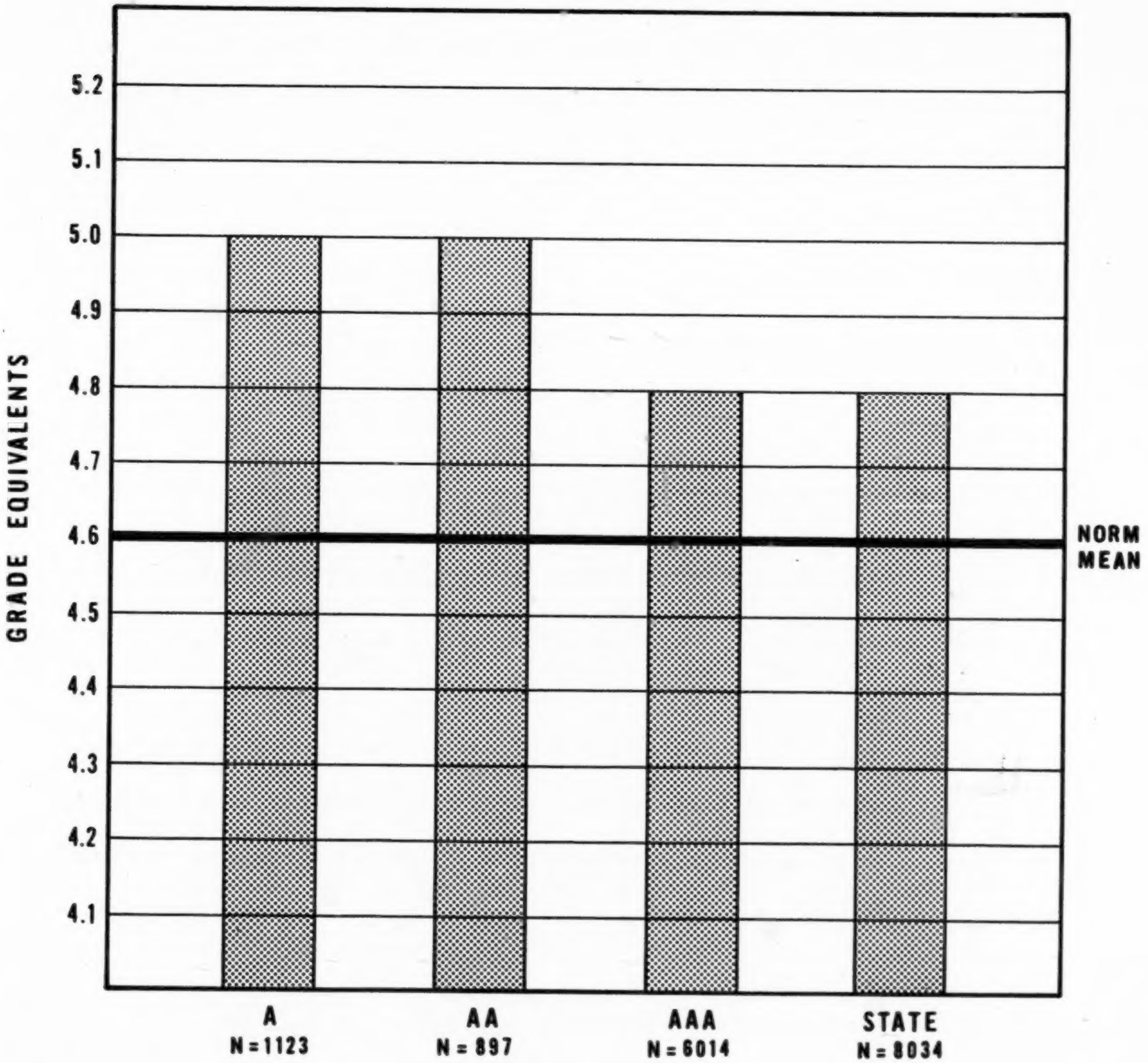
MATHEMATICS

The CTBS Arithmetic Test is divided into three parts: Computation, Concepts, and Applications. The Computation subtest has 48 items equally distributed among the four fundamental operations: addition, subtraction, multiplication, and division. The 30-item Concepts subtest measures the ability of the student to recognize and/or apply the appropriate concept and technique (method, operation, structure, formula, principle). Twenty items are included in the Applications subtest which places emphasis upon problem solving.

Grade 4

Grade Equivalent Comparisons - Missouri vs. Norm

Mathematics scores were obtained from 8,034 fourth graders. Figure III-7 shows Mathematics Totals in mean grade equivalents for the three district classifications (A, AA, and AAA), and the state as a whole (a composite of the three classifications). These are plotted against the norm group. This figure shows that A and AA students recorded average performances 4 months in excess of norm performance while the AAA students (and the state as a whole) surpassed this comparative group by two months on the average. These differences represent an extremely favorable position for the Missouri students. (Generally, data presented for the state as a whole very closely resemble the data for the AAA schools because AAA students represent over two-thirds of the state sample.)



(N = Number of students participating)

FIGURE III-7. MATHEMATICS TOTALS VS NORM MEAN (GRADE 4)

In obtaining the Grade 4 Mathematics Total scores presented in Figure III-7, students completed three subtest sections; Computation, Concepts, and Applications. Missouri students in each district classification exceeded the norm group in all three subtests; the differences (in months) are presented in Table III-4.

Table III-4

MATHEMATICS SCORES

DIFFERENCES IN MONTHS (BY DISTRICT CLASSIFICATION)

Missouri vs. Norm - Grade 4

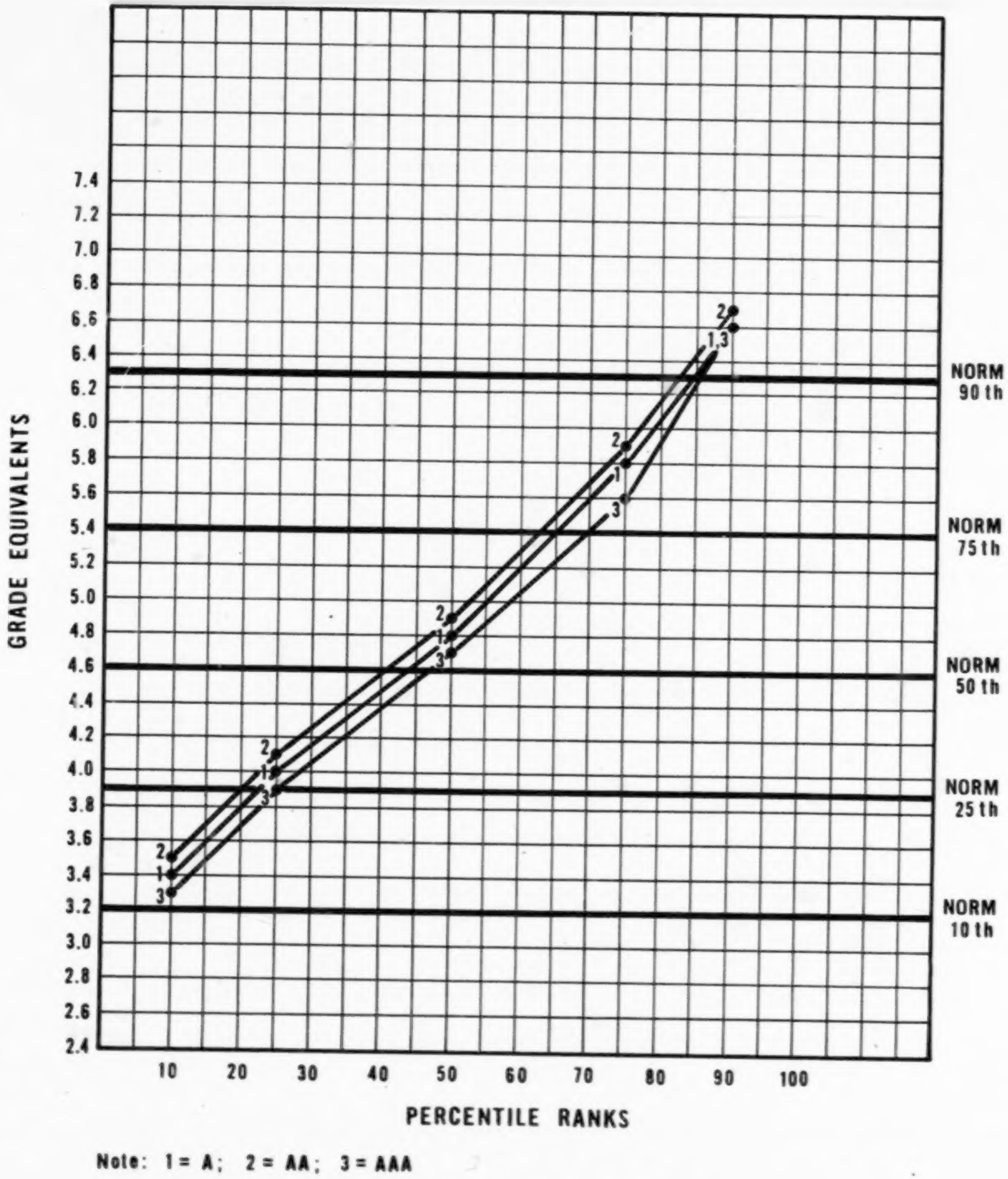
	Computation	Concepts	Applications
A	4 months	3 months	1 month
AA	4 months	5 months	2 months
AAA	2 months	3 months	1 month

Note that, relatively speaking the application of Mathematics knowledge to a practical situation is performed less well than the other areas, although the performance in all areas is above the norm. Appendix G contains mean and standard deviation subtest information for fourth-grade Mathematics achievement.

Grade Equivalent Comparisons by Percentile Rank

Further information on student performance can be obtained by comparing the grade equivalents of the norm group with those of the Missouri students at various points along the percentile scale. (See discussion of percentiles Page III-5.)

For the Missouri study, comparisons of grade equivalents were made at the 10th, 25th, 50th, 75th, and 90th percentile points. Figure III-8 shows



Note: 1 = A; 2 = AA; 3 = AAA

FIGURE III-8. MATHEMATICS TOTAL – CUMULATIVE FREQUENCY DISTRIBUTION (GRADE 4)

the grade equivalents for the A, AA, and AAA schools at these same percentile points. These data indicate that 1) proportionately fewer Missouri students than those in the norm group scored very low (at or below a 3.2), 2) that the grade equivalent at which 50 per cent are above and 50 per cent are below is higher for the Missouri group than for the norm group, and 3) a proportionately higher number of students than those in the norm group scored very high (above a 6.3).

With a minor exception at the 90th percentile, the grade equivalents at each percentile being compared were greater for the AA's than the A's and greater for the A's than the AAA's.

Anticipated Achievement Comparisons*

The information presented in this section relates obtained performance of the Missouri fourth graders in Mathematics to their expected performance. Student performance was determined from the administration of the *Comprehensive Tests of Basic Skills* (CTBS). Expected performance (anticipated achievement) was determined from scores on the *Short Form Test of Academic Aptitude* (SFTAA), along with such information as age, grade, and sex. (See Page II-2 for a discussion of anticipated achievement.)

Figure III-9 shows that the average performance of the A and AA students exceeded their expected performance by three months in grade equivalent units

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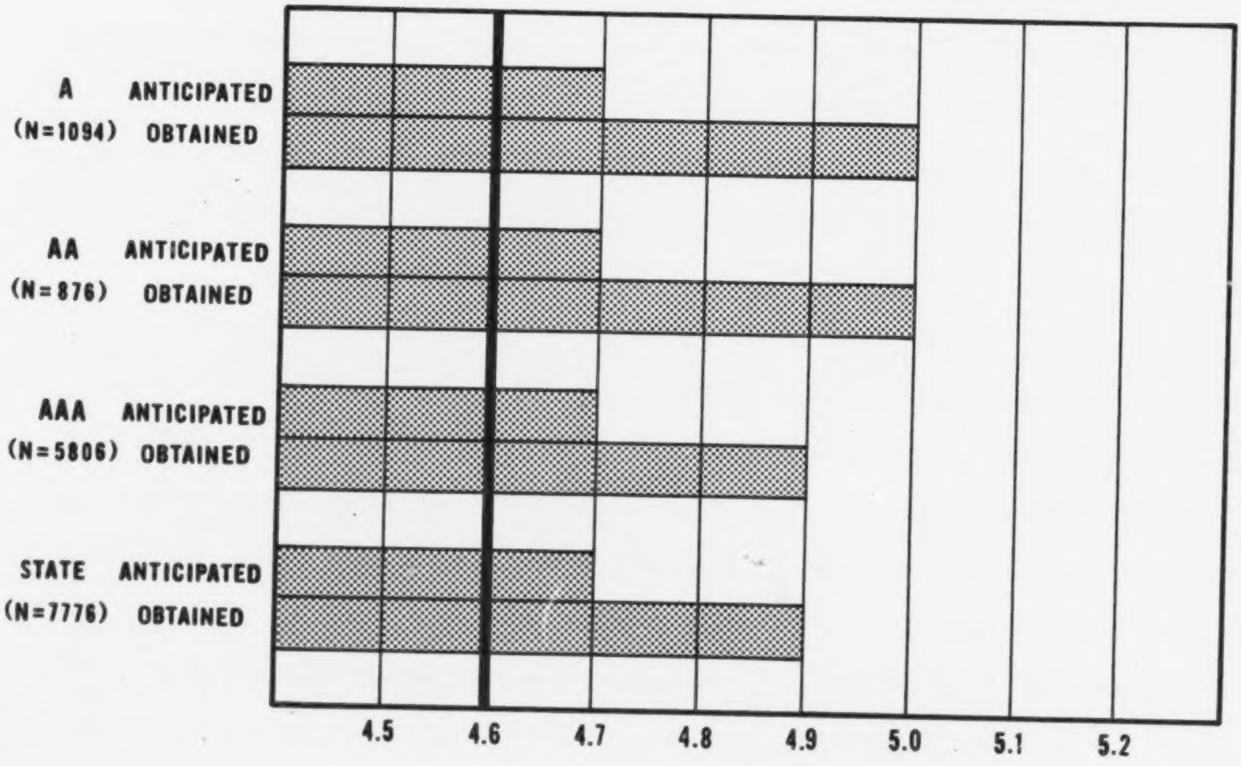
*Some figures presented in this section will not match exactly the figures from the previous section because only students with a complete set of data, i.e., ability and achievement test scores, were included in this sample. Exclusion of missing data will generally result in slightly more positive trends.



Note: Heavy vertical line represents the mean normative score at the time the Missouri students took the test.

(N = Number of students participating)

FIGURE III-9. ANTICIPATED VS OBTAINED ACHIEVEMENT IN MATHEMATICS (GRADE 4)

while the AAA students on the average were in excess by two months. The state as a whole is shown to be on the average two months in excess of expectation. Appendix H contains mean anticipated and obtained subtest scores for the Missouri sample.

If the distribution of students who score significantly above and below their anticipated achievement equals that of the norm group, one would expect 10 per cent to score above their expected achievement and 10 per cent to score below. Positive trends result if more than 10 per cent score significantly above and/or less than 10 per cent score significantly below.

In the case of fourth-grade scores on Mathematics Total, significant strengths appear at all three district classification levels (A, AA, and AAA) as percentages of students in excess of 10 per cent are above expectation while percentages less than 10 per cent are below. The real strength is the exceedingly large number of students above expectation in the Computation area (18%) and the high percentage of students scoring above that which was predicted on the Concepts subtest (13%). Coupled with this, though not quite so dramatic, is the fact that on these two subtests a lesser percentage than expected scored significantly below anticipated achievement (8 per cent for Computation, 6 per cent for Concepts).

The Missouri students did not achieve totally superior performance to the norm group because, in the Applications subtest, percentages above and below were generally the same as for the norm group.

Table III-5 shows the information for Total Mathematics and the number of Missouri fourth-grade students who would be expected to fall into the above and below categories. By generalizing and extending the sample to the total population, the best estimate is also presented of the numbers of students who would fall into each category if all were to have been tested. Appendix I contains the percentages of Missouri students above, at, and below anticipated achievement for the subtests in Mathematics.

Table III-5

PERCENTAGES AND ESTIMATED NUMBERS OF STUDENTS IN MISSOURI SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 4 Mathematics

	% Above	% Below	No. Mo. Stu.*	Exp.** Above	Actual** Above	Exp.** Below	Actual** Below
A	16	6	10,000	1,000	1,600	1,000	600
AA	19	5	8,200	820	1,558	820	410
AAA	15	7	62,100	6,210	9,315	6,210	4,347
State	16	6	80,300	8,030	12,848	8,030	4,818
Norm	10	10					

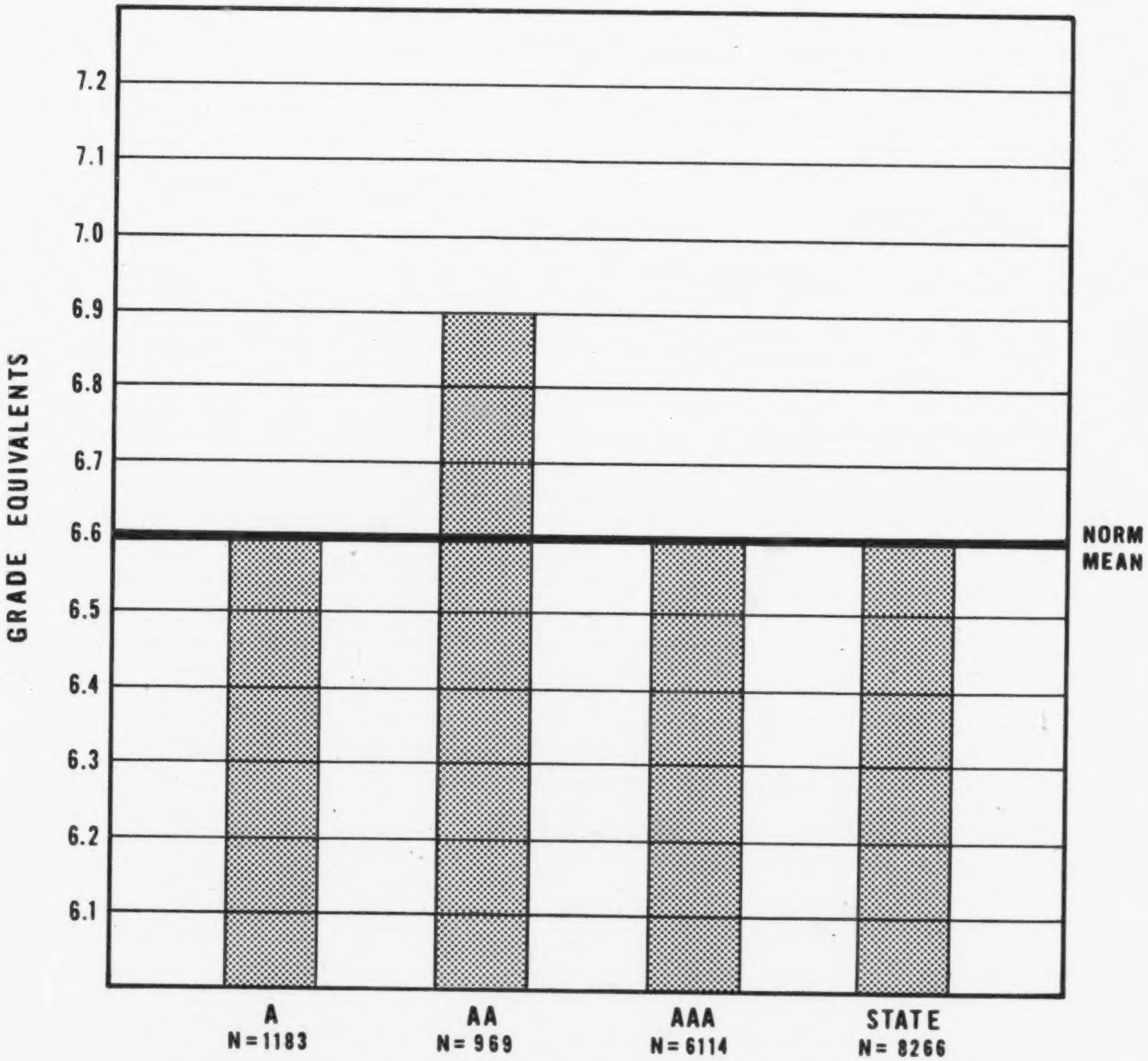
*The figures in this column represent the number of Missouri students in September, 1970, and are rounded to the nearest 100.

**These numbers represent inferences made from the sample to the entire Missouri Grade 4 population.

Grade 6

Grade Equivalent Comparisons - Missouri vs. Norm

Mathematics scores were obtained from 8,266 sixth graders. Figure III-10 shows Mathematics Total scores in grade equivalents for the three district classifications (A, AA, and AAA), the state as a whole (a composite of the three classifications). These are plotted against the norm group. This



(N= Number of students participating)

FIGURE III-10. MATHEMATICS TOTALS VS NORM MEAN (GRADE 6)

figure shows that the average student performance from both the A and AAA schools (and thus, the state as a whole) matches normative performance. The average performance for students from the AA schools was three months in excess of norm achievement.

In obtaining the Grade 6 Mathematics Total scores presented in Figure III-10, students completed three subtest sections: Computation, Concepts, and Applications. The Missouri students performed comparably to the norm on each of the subtests. The difference, expressed in months between the norm group and each of the district classifications, is given in Table III-6.

Table III-6

MATHEMATICS SCORES
DIFFERENCES IN MONTHS (BY DISTRICT CLASSIFICATION)

Missouri vs. Norm - Grade 6

	Computation	Concepts	Applications
A	1 month	0 months	-1 month
AA	2 months	3 months	3 months
AAA	-1 month	2 months	0 months

Note: Positive numbers favor the Missouri sample.

There really exists no specific pattern of subtest performance throughout the state other than the differences favoring the AA students across the board. Appendix J contains mean and standard deviation subtest information for sixth-grade Mathematics achievement.

Grade Equivalent Comparisons by Percentile Rank

Further information on student performance can be obtained by comparing the grade equivalents of the norm group with those of the Missouri students at various points along the percentile scale. (See discussion of percentiles Page III-5.)

For this purpose, comparisons of grade equivalents were made at the 10th, 25th, 50th, 75th, and 90th percentile points. Figure III-11 shows the grade equivalents for the A, AA, and AAA schools at these same percentile points. The data indicate that 1) proportionately fewer Missouri students than those in the norm group scored very low (at or below 4.3), but that 2) the distribution from the 50th to the 90th percentile generally favored the norm group. The AA group presented a very positive distribution relative to normative performance, but this represented only a small percentage of the total Missouri sample.

Anticipated Achievement Comparisons*

The information presented in this section relates obtained performance of the Missouri sixth graders in Mathematics to their expected performance. Student performance was determined from the administration of the *Comprehensive Tests of Basic Skills*. Expected performance (anticipated achievement)

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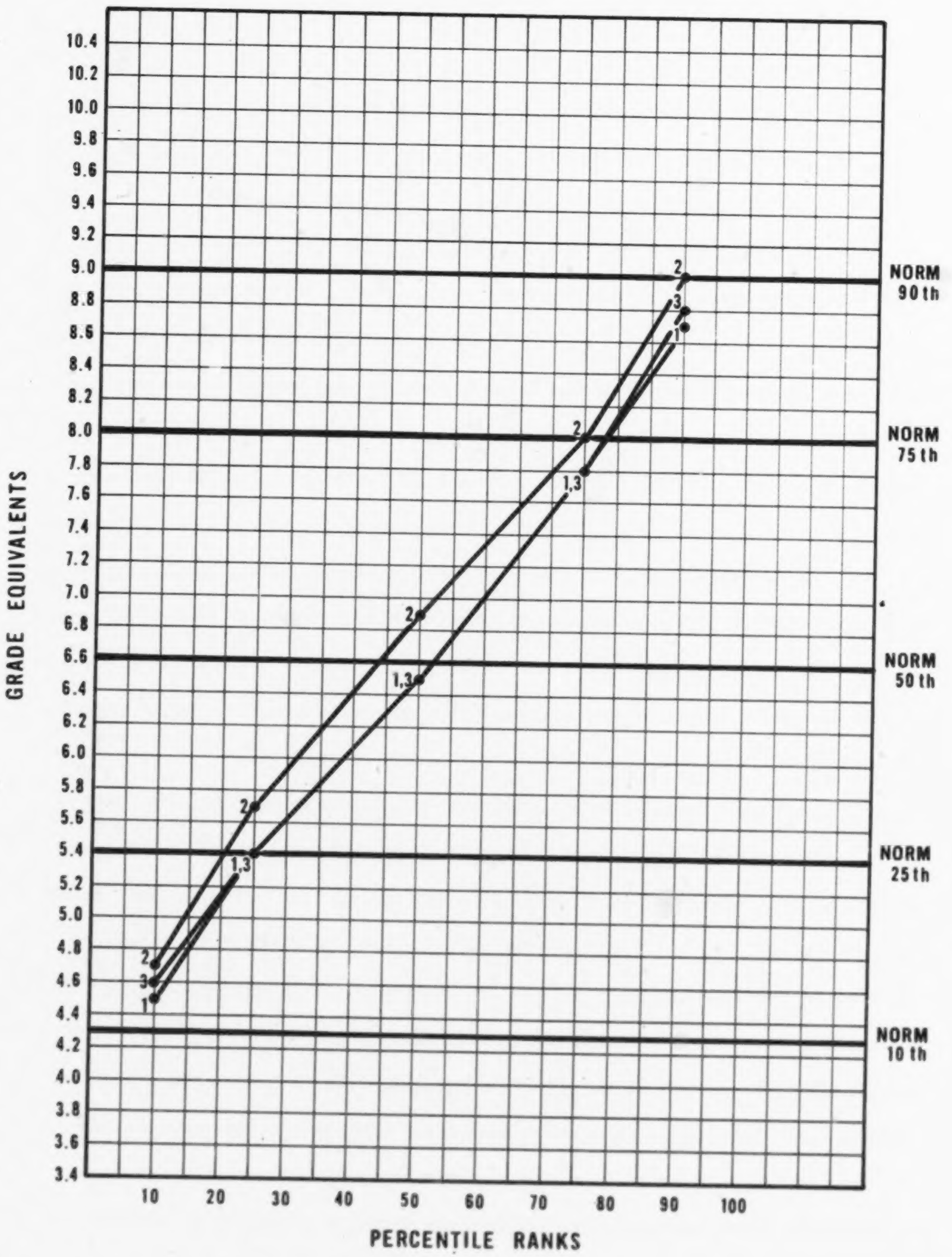
*Some figures presented in this section will not match exactly the figures from the previous section because only students with a complete set of data, i.e., ability and achievement test scores, were included in this sample. Exclusion of missing data will generally result in slightly more positive trends.



Note: 1= A; 2= AA; 3= AAA

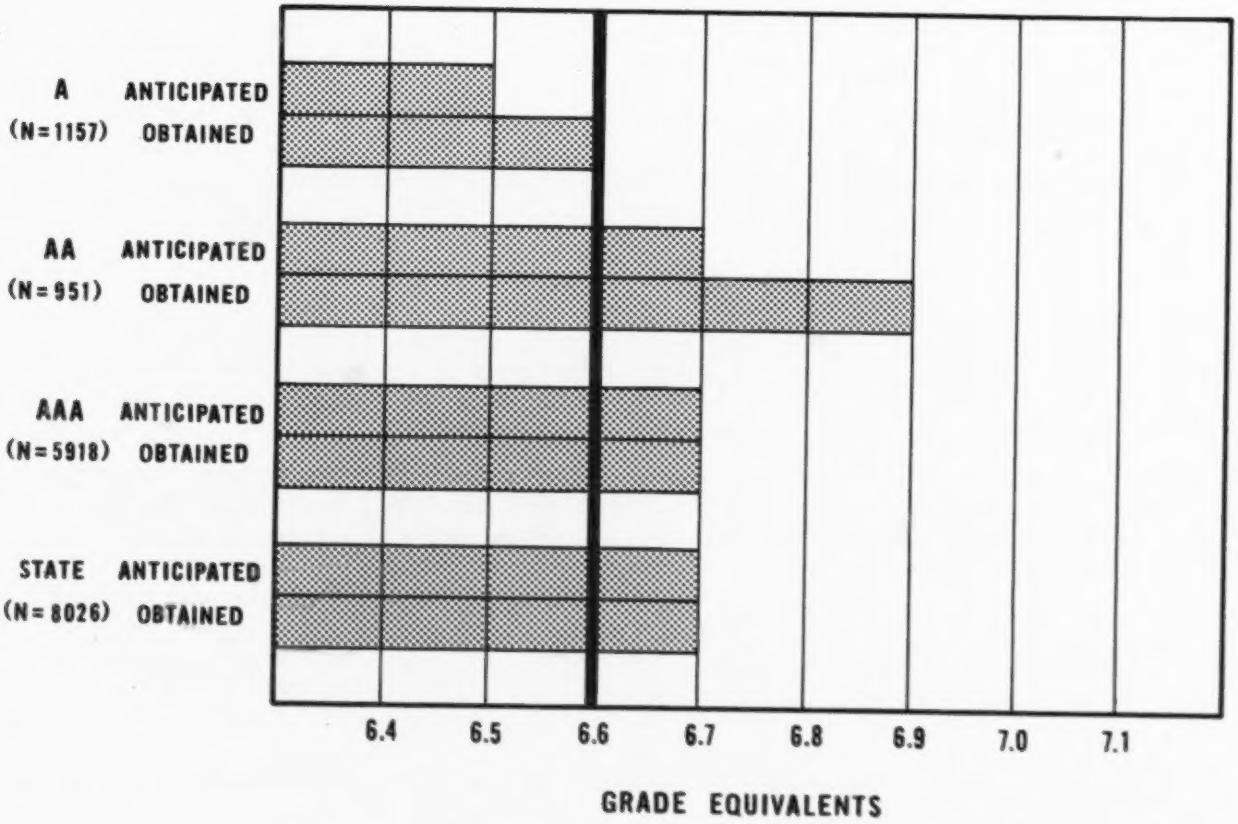
FIGURE III-11. MATHEMATICS TOTAL – CUMULATIVE FREQUENCY DISTRIBUTION (GRADE 6)

was determined from scores on the *Short Form Test of Academic Aptitude*, along with such information as age, grade, and sex. (See Page II-2 for a discussion of anticipated achievement.)

Figure III-12 shows that the AA and A students performed above their expected performance by 1 and 2 months respectively, a relatively minor difference. The anticipated and obtained scores matched for the AAA students and the state as a whole. It has been indicated at several points in this report that the state totals generally are the same as the AAA totals because the AAA students comprise a great majority of the sample. Appendix H contains mean anticipated and obtained subtest scores for the Missouri sample.

If the distribution of students who score significantly above and below their anticipated achievement equals that of the norm group, one would expect 10 per cent to score above their expected achievement and 10 per cent to score below. Positive trends result if more than 10 per cent score significantly above and/or less than 10 per cent score significantly below.

In the case of sixth-grade scores on the Mathematics Total for the state, the distribution of those significantly above and below anticipated achievement is identical to that of the norm group, i.e., 10 per cent above and 10 per cent below. Basic strengths lie with the distributions of the AA schools for all subtests. Close to twice as many AA students scored above anticipated achievement on the three subtests, Computation, Concepts, and Applications as scored below (Computation 14% - 7%; Concepts 15% - 7%; Applications 13% - 7%). The only observable problem was the average AAA student performance on the Computation subtest with a 9 per cent above, 13 per cent below distribution. Statewide strength appeared to be with the Concepts subtest, with 13 per cent above and 7 per cent below distribution.



Note: Heavy vertical line represents the mean normative score at the time the Missouri students took the test.

(N = Number of students participating)

FIGURE III-12. ANTICIPATED VS OBTAINED ACHIEVEMENT IN MATHEMATICS (GRADE 6)

Table III-7 presents the information for Mathematics Total and the number of Missouri sixth-grade students who would be expected to fall into the above and below categories. By generalizing and extending the sample to the total population, the best estimate is presented of the numbers who would fall into each category if all were to have been tested. Appendix K contains the Missouri percentages of Grade 6 students above, at, and below anticipated achievement categorized by Mathematics subtests.

Table III-7

PERCENTAGES AND ESTIMATED NUMBERS OF STUDENTS IN MISSOURI SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 6 Mathematics

	% Above	% Below	No. Mo. Stu.*	Exp.** Above	Actual* Above	Exp.** Below	Actual** Below
A	10	9	9,900	990	990	990	891
AA	14	8	8,000	800	1,120	800	640
AAA	9	11	60,000	6,000	5,400	6,000	6,600
State	10	10	77,900	7,790	7,790	7,790	7,790
Norm	10	10					

*The figures in this column represent the number of Missouri students in September, 1970, and are rounded to the nearest 100.

**These numbers represent inferences made from the sample to the entire Missouri Grade 6 population.

Mathematics Summary

Data presented for the three classifications in each of Grades 4 and 6 indicated a positive condition throughout the state. The situation was much more favorable, however, in fourth than in sixth grade. Information was presented from within three contexts. The first was to compare the achievement of the Missouri students to that represented by the nationwide normative sample. It was determined that in Grade 4 the total Missouri sample tested, on the average, 2 months ahead of the norm group (based upon grade equivalent data). However, A and AA students recorded average performances four months in excess of norm performance. Sixth-grade performance for the state equaled the norm group. A division by classification showed the AA students to be, on the average, 3 months ahead of the norm. The second method used to present the findings was to compare the achievement of the Missouri students to what would be expected of them (anticipated achievement comparisons). Favorable results were again recorded in Grade 4 with the average student performance 2 months in excess of expectancies (3 months for A and AA). In Grade 6, there was no discrepancy between the average obtained and anticipated achievement when the total sample was considered. However, the A's were one month and the AA's two months ahead of expectation.

If the distribution of students in Missouri were like that of the norm group, 10 per cent would score significantly above anticipated achievement and 10 per cent would score significantly below. Positive trends would, therefore, be reflected in a Missouri distribution with more than 10 per cent scoring above and/or fewer than 10 per cent scoring below. This was the third means for presenting the data. In the fourth grade, for the state, a distribution decidedly favoring the Missouri students resulted as 16 per cent were significantly above and only 6 per cent significantly below. In the sixth grade 10 per cent were above and 10 per cent were below, matching exactly the norm distribution. Table III-8 looks at each of the three modes of data presentation by district classification with the emphasis given to possible strengths and problems within each group of students.

Table III-8

SUMMARY OF COMPARISONS
MATHEMATICS

A. Missouri vs. Norm Group Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	4	4	2	2
Grade 6	0	3	0	0

Note: Differences reported in number of months. Positive differences favor Missouri; negative differences favor the norm group.

B. Missouri Anticipated vs. Obtained Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	3	3	2	2
Grade 6	1	2	0	0

Note: Differences reported in number of months. Positive differences favor obtained over anticipated; negative differences favor anticipated over obtained.

C. Missouri vs. Norm -- Percentages ABOVE Anticipated Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	6	9	5	6
Grade 6	0	4	-1	0

Note: Differences reported in percentages. Positive differences favor Missouri; negative differences favor the norm group.

D. Missouri vs. Norm -- Percentages BELOW Anticipated Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	4	5	3	4
Grade 6	1	2	-1	0

Note: Differences reported in percentages. Positive differences favor Missouri; negative differences favor the norm group.

LANGUAGE

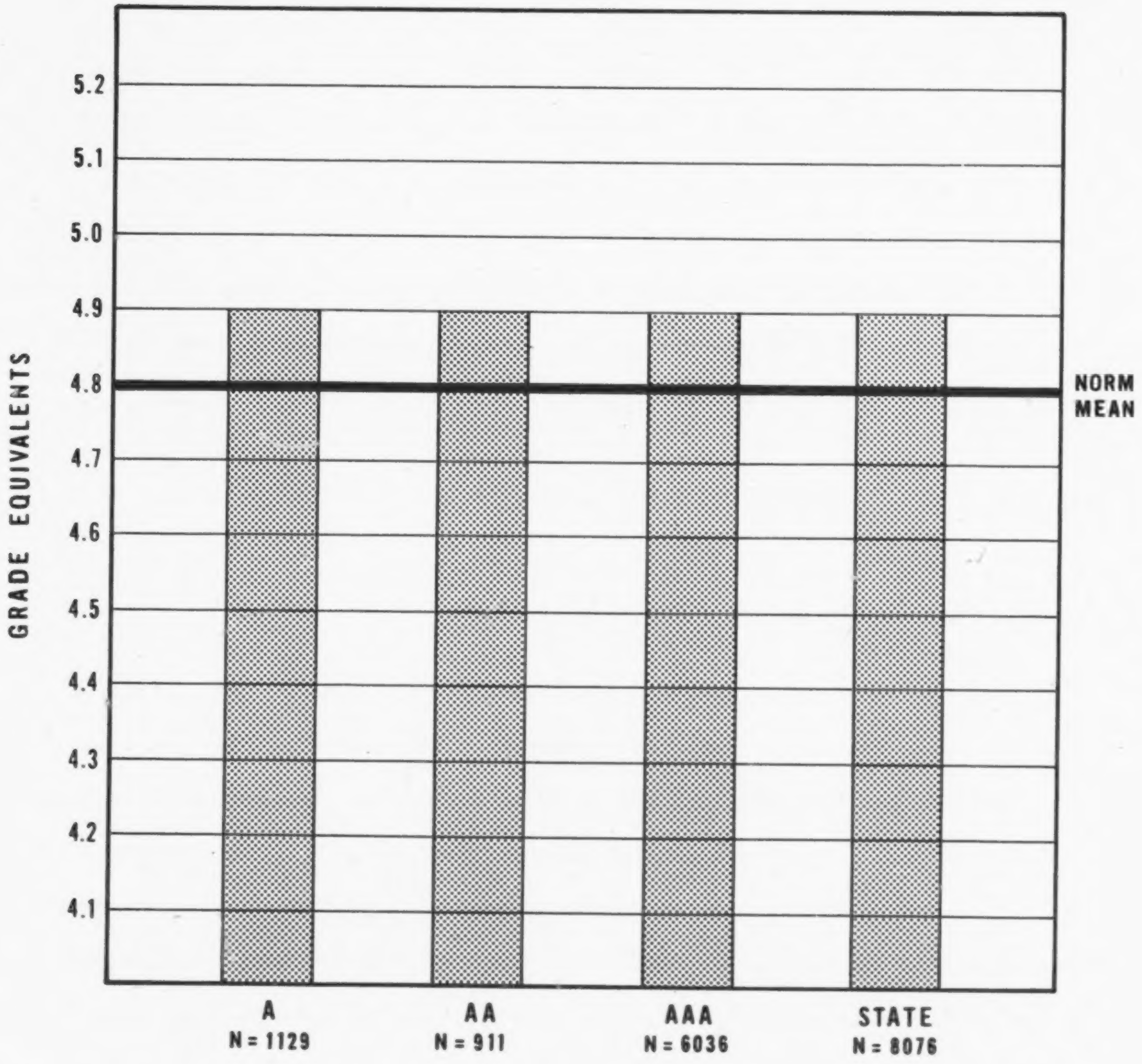
The CTBS Language Test is divided into three parts: Mechanics, Expression, and Spelling. The Mechanics subtest contains 25 items, 13 of which measure punctuation with 12 measuring capitalization. The 30 items of the Expression subtest measure the correctness and effectiveness of expression. There are 30 items measuring spelling proficiency in the Spelling subtest. Four scores are reported: Mechanics, Expression, Spelling, and Language Total. Test results are discussed below by grade.

Grade 4

Grade Equivalent Comparison - Missouri vs. Norm

Language scores were obtained from 8,076 fourth graders. Figure III-13 shows Language Totals in mean grade equivalents for the three district classifications (A, AA, and AAA), and the state as a whole (a composite of the three classifications). These are plotted against the norm group. This figure shows that there are no differences among the average scores of the three classifications and that the average student performance exceeded normative achievement by one month. (One month difference either side of the norm line in a practical sense represents little difference at all.)

In obtaining the total scores presented in Figure III-13, students in the A schools showed slightly better comparative performances to the norm group in Spelling than in the Mechanics and Expression areas. There was a two month advantage in Spelling, while in the Mechanics area there was a one month difference favorable to these students. No average performance



(N = Number of students participating)

FIGURE III-13. LANGUAGE TOTALS VS NORM MEAN (GRADE 4)

differences existed between the A students and the norm group in the Expression subtest. The students from AA classified schools fit somewhat the same pattern with larger differences favoring Missouri in Spelling (3 months) than in Mechanics (1 month) or Expression (1 month). Students in the AAA schools also performed comparatively better on the Spelling subtest than on the Mechanics or Expression subtests. The average AAA students' performance exceeded the norm group by three months of grade equivalent units in Spelling, by one month in Expression, and matched the norm group in Language Mechanics.

When all students in the state were considered (regardless of classification of school to which they attend) the comparative performance of the Missouri students to the norm group was exactly the same as for the AAA schools. (All subsequent data presented for the state as a whole will resemble very closely the AAA schools because AAA students represent over two-thirds of the state sample.)

Appendix L contains mean and standard deviation subtest information on fourth-grade Language achievement.

Grade Equivalent Comparisons by Percentile Rank

Further information on student performance can be obtained by comparing the grade equivalents of the norm group with those of the Missouri students at various points along the percentile rank scale, which ranges from 1 to 100. (See discussion of percentiles Page III-5.)

For the Missouri study, comparisons of grade equivalents were made at the 10th, 25th, 50th, 75th, and 90th percentile points. Figure III-14 shows the grade equivalents for the A, AA, and AAA schools at these same percentile points. This figure shows that the grade equivalent at the 10th percentile is one month higher for the Missouri sample than for the norm group indicating a distribution slightly favoring Missouri. This is also true at the 50th percentile. Approximately the same is true at the 90th percentile. From this information, one can conclude that the distribution of the Missouri group is slightly favorable to that of the norm group but really not enough to indicate a significant departure from a practical point of view.

Anticipated Achievement Comparisons*

The information presented in this section relates obtained performance of the Missouri fourth graders in Language to their expected performance. Student performance was determined from the administration of the CTBS. Expected performance (anticipated achievement) was predicted from scores on the *Short Form Test of Academic Aptitude*, along with such information as age, grade, and sex. (See Page II-2 for a discussion of anticipated achievement.)

Figure III-15 shows that, on the average, the students from the A classification schools performed two months in excess of expectancy, the AAA students, one month in excess, and the AA students equal to their level of anticipated

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*Some figures presented in this section will not match exactly the figures from the previous section because only students with a complete set of data, i.e., ability and achievement test scores, were included in this sample. Exclusion of incomplete cases, if sufficient, will generally result in slightly more positive trends.

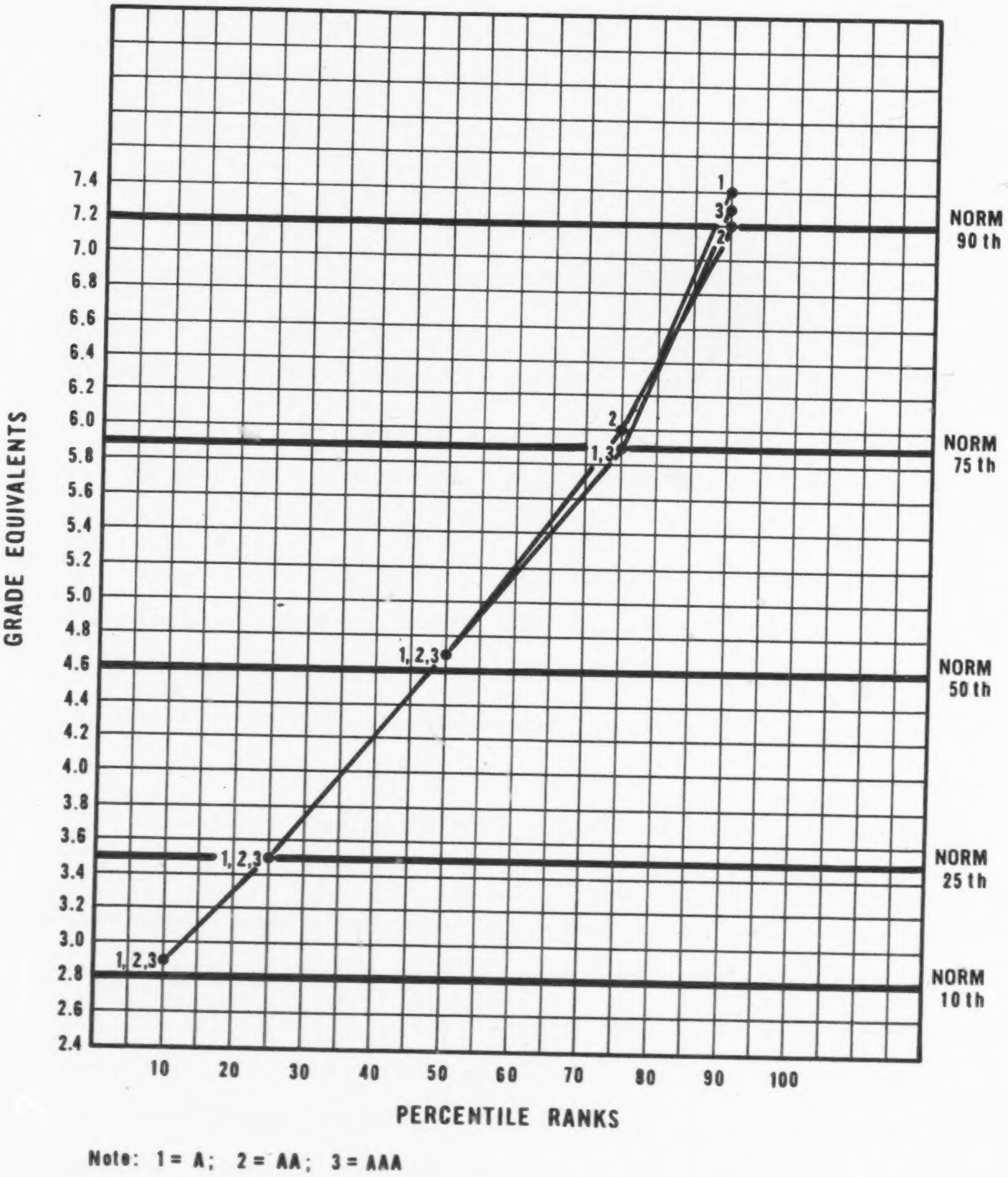


FIGURE III-14. LANGUAGE TOTAL – CUMULATIVE FREQUENCY DISTRIBUTION (GRADE 4)

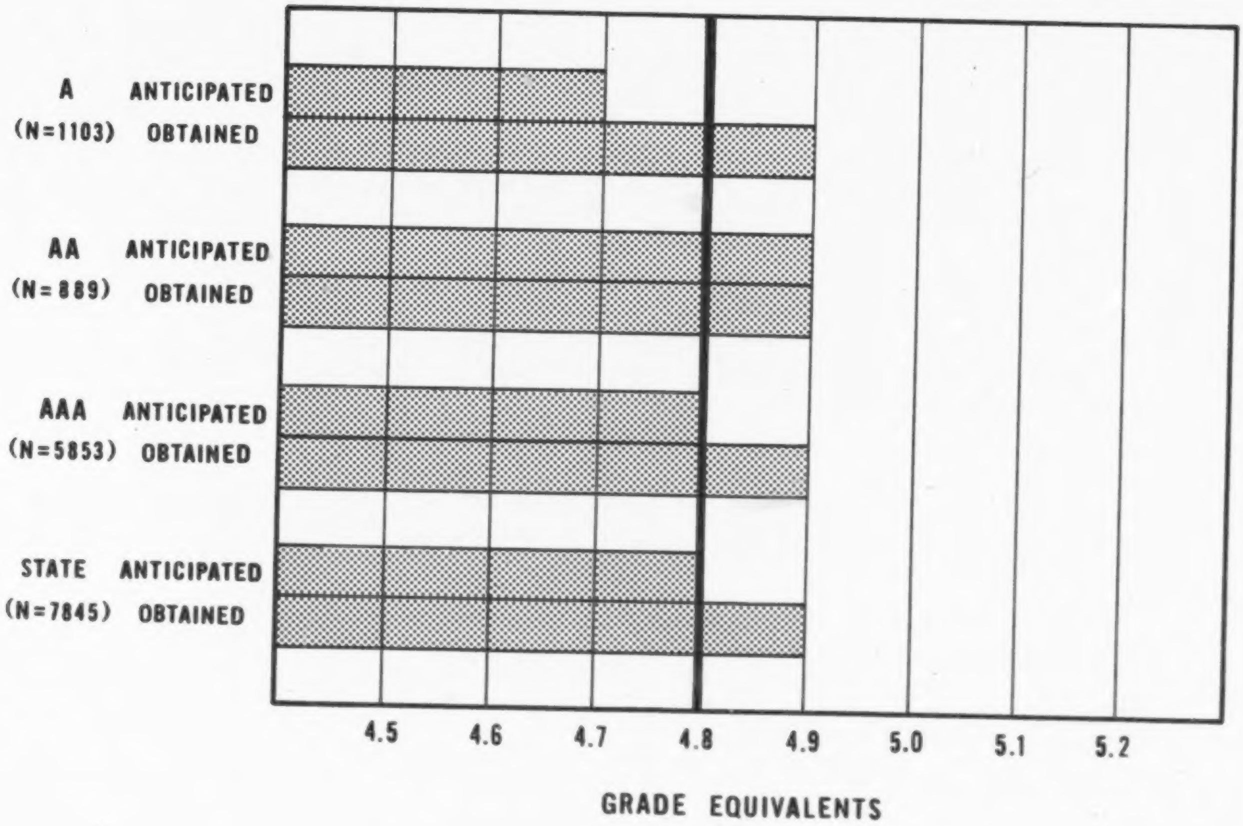
achievement. When all students are considered, the state as a whole performed on an average of one month ahead of their anticipated achievement.

Appendix M contains mean anticipated and obtained subtest scores for the Missouri sample.

If the distribution of students who score significantly above and below their anticipated achievement equals that of the norm group, one would expect 10 per cent to score above their expected achievement and 10 per cent to score below. Positive trends result if more than 10 per cent score significantly above and/or less than 10 per cent score significantly below.

In the case of the fourth-grade scores on Language Total, each of the three groups of students (those from A, AA, and AAA schools) recorded higher percentages of students that were above anticipated achievement than the numbers recorded for the norm group. However, at each classification level more students than would be expected were significantly below anticipated achievement. Hence, there is one comparative positive result and one negative one. The greatest contribution on the positive side was from the many students across all classifications who were significantly above anticipated achievement in Spelling (about 15 per cent). The major contributing factor to the excessive number performing below expectation resulted from the large numbers who performed below expectation on the Expression subtest (about 13 per cent).

Table III-9 presents this information and the total number of Missouri students who would be expected to fall into the above and below categories. By generalizing and extending the sample to the total population, the best



Note: Heavy vertical line represents the mean normative score at the time the Missouri students took the test.

(N = Number of students participating)

FIGURE III-15. ANTICIPATED VS OBTAINED ACHIEVEMENT IN LANGUAGE (GRADE 4)

estimate is presented of the numbers who would fall into each category if all were to have been tested. Appendix N contains the percentages of Missouri Grade 4 students who were above and below anticipated achievement categorized by the Language subtests.

Table III-9

PERCENTAGES AND ESTIMATED NUMBERS OF STUDENTS IN MISSOURI SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 4 - Language

	% Above	% Below	No. Mo. Stu.*	Exp.** Above	Actual** Above	Exp.** Below	Actual** Below
A	15	12	10,000	1,000	1,500	1,000	1,200
AA	13	16	8,200	820	1,066	820	1,312
AAA	14	13	62,100	6,210	8,694	6,210	8,073
State	14	13	80,300	8,030	11,242	8,030	10,439
Norm	10	10					

*The figures in this column represent the number of Missouri students in September, 1970, and are rounded to the nearest 100.

**These numbers represent inferences made from the sample to the entire Missouri Grade 4 population.

Grade 6

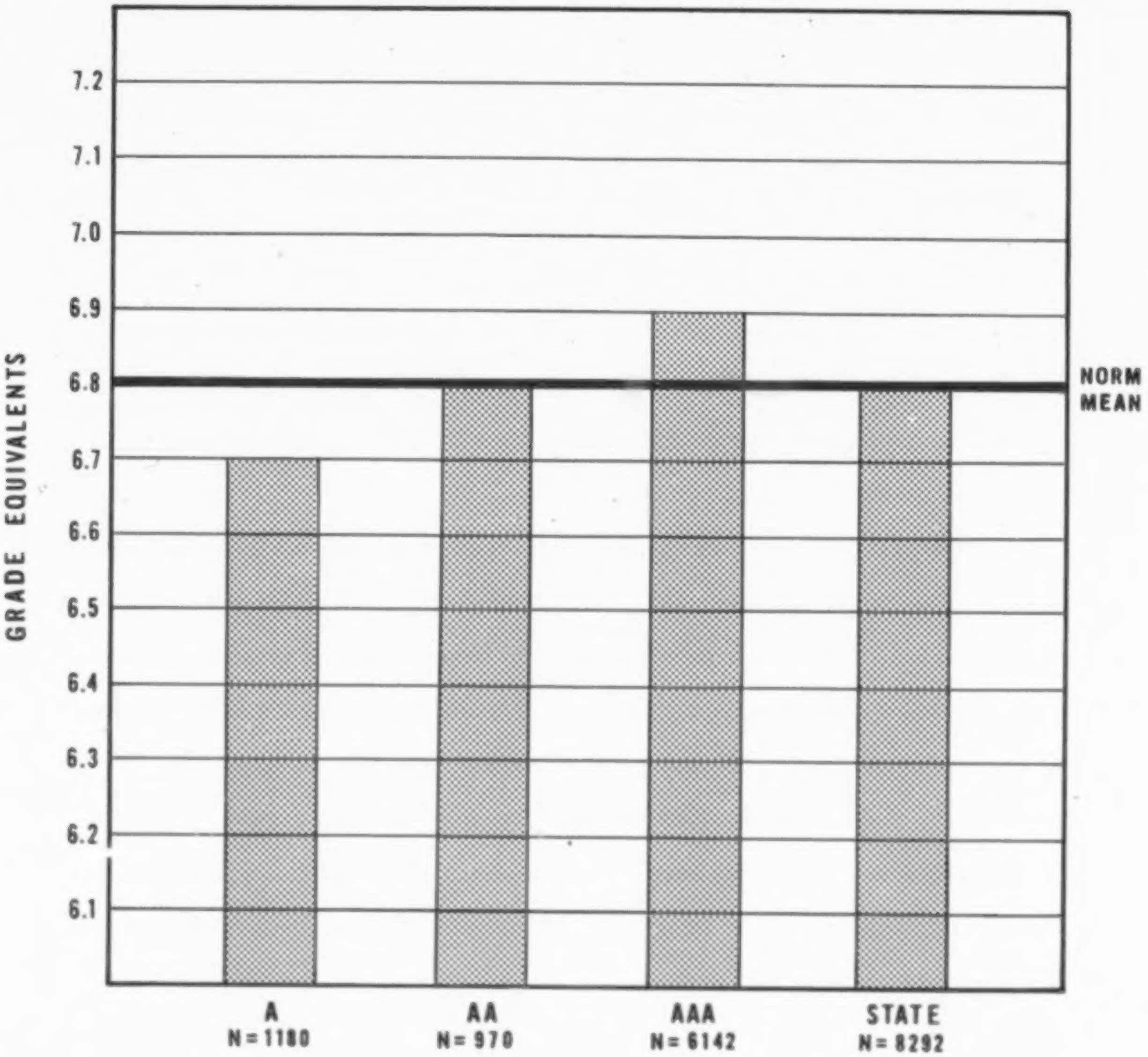
Grade Equivalent Comparisons - Missouri vs. Norm

Language scores were obtained from 8,292 sixth graders. Figure III-16 shows reading totals in mean grade equivalents for the three district classifications (A, AA, AAA), and the state as a whole (a composite of the three classifications). These are plotted against the norm group. This figure displays a stepladder effect as students from the A schools performed, on the average, one month less than the norm, the AA students matched the norm, and the AAA students exceeded the norm by a month. State performance matched that of the norm group. When considering differences from a practical point of view, a difference of one month on either side of the norm line represents little difference at all. It would appear that, to a minor degree, AAA students have an average higher achievement level in Language than the students from the A schools in Grade 6. Otherwise, no real differences exist. Appendix O contains mean and standard deviation subtest information on sixth-grade Language scores.

The subtests for the Language test are Mechanics, Expression, and Spelling. Scores recorded on the Figure III-16 are a composite of the three subtests. The major deviation from the norm for the students in the A schools was a three-month less-than-norm performance in Expression. They averaged slightly better scores in Mechanics (1 month) and matched the norm in Spelling. A one month positive difference in Spelling was the only subtest deviation between the AA students and the norm group. The students from the AAA schools scored, on the average, one month in excess of the norm on the Mechanics and Expression subtests and two months in Spelling. (See Appendix O.)

Grade Equivalent Comparisons by Percentile Rank

Further information on student performance can be obtained by comparing the grade equivalents of the norm group with those of the Missouri students at various points along the percentile rank scale from 1 to 100. (See discussion



(N = Number of students participating)

FIGURE III-16. LANGUAGE TOTALS VS NORM MEAN (GRADE 6)

of percentiles Page III-5.) For the assessment, comparisons of grade equivalents were made at the 10th, 25th, 50th, 75th, and 90th percentile points. Figure III-17 shows the grade equivalents for the A, AA, and AAA schools at these same percentile points. These data indicate that proportionately fewer Missouri students than those in the norm group scored very low (at or below a 3.8). Similar, but not as significant, results are evident at the 25th and 50th percentiles. (Recall that AAA students comprise the vast majority of the sample.) The distribution for the students in A schools equaled the norm at the lower percentiles but grew less favorable at the 75th and 90th percentiles. The AA and AAA distribution were the same except for slight deviations at the 10th and 90th percentile. Both were slightly above norm at the 10th percentile. (Note that the AA students could perform to a small degree less well than the AAA students and still rank in the top 10 per cent of their distribution.)

Anticipated Achievement Comparisons*

The information presented in this section relates obtained performance of the Missouri sixth graders, to their expected performance, in Language. (See Page II-2 for a discussion of anticipated achievement.)

Figure III-18 shows that students from A schools were, on the average, somewhat behind those from AA and AAA schools, and the norm. Nevertheless, they performed about two months in excess of expectation. The AA students

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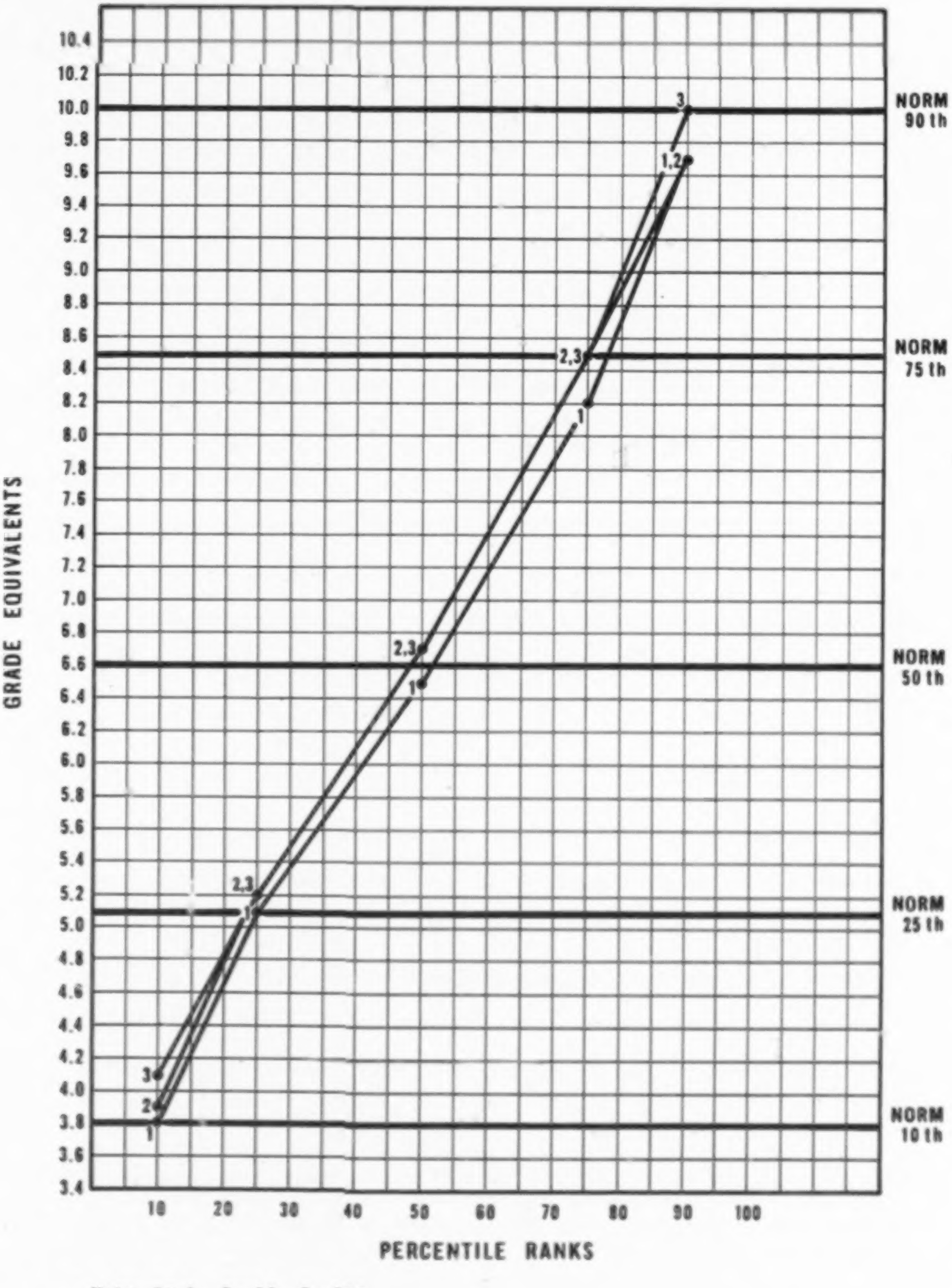
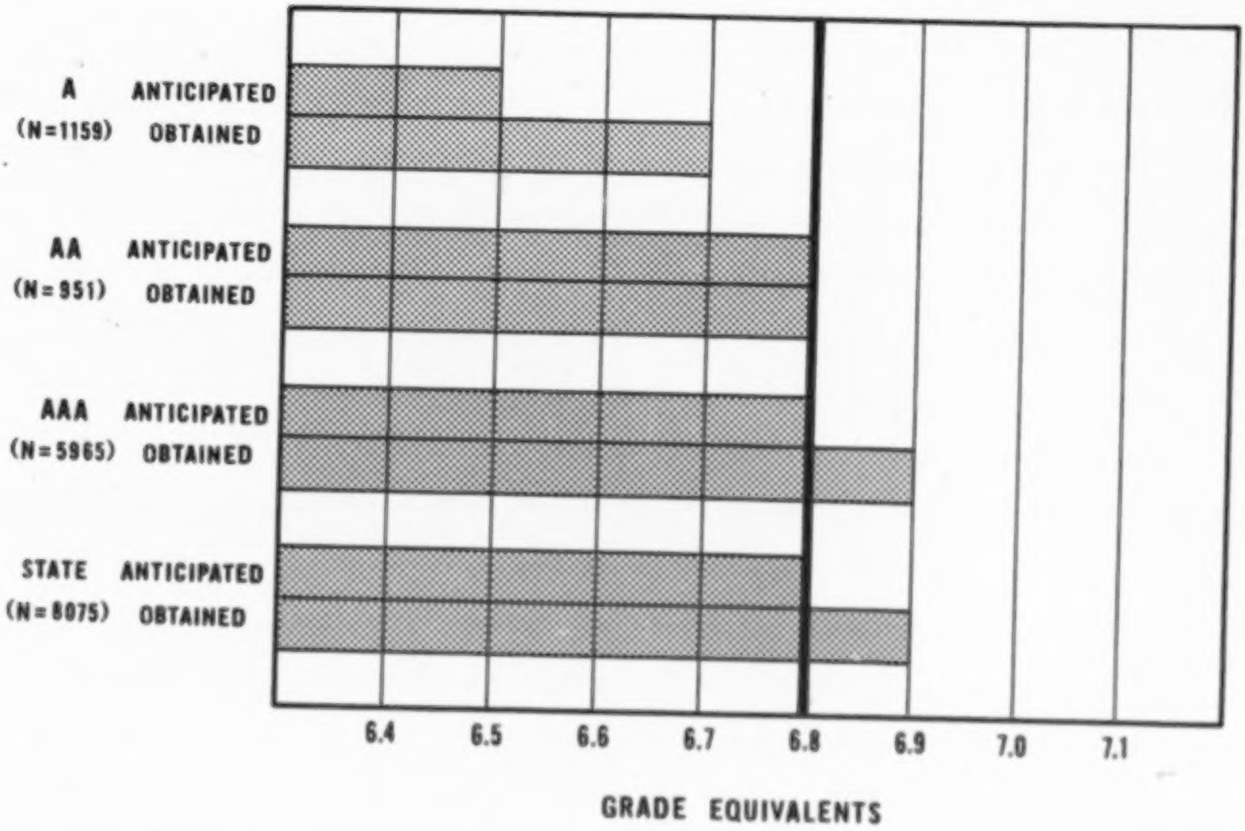
*Some figures presented in this section will not match exactly the figures from the previous section because only students with a complete set of data, i.e., ability and achievement test scores, were included in this sample. Exclusion of incomplete cases, if sufficient, will generally result in slightly more positive trends.



Note: 1 = A; 2 = AA; 3 = AAA

FIGURE III-17. LANGUAGE TOTAL–CUMULATIVE FREQUENCY DISTRIBUTION (GRADE 6)



Note: Heavy vertical line represents the mean normative score at the time the Missouri students took the test.

(N = Number of students participating)

FIGURE III-18. ANTICIPATED VS OBTAINED ACHIEVEMENT IN LANGUAGE (GRADE 6)

matched the achievement predicted for them, while the AAA and the total state sample surpassed their anticipated achievement, on the average, by one month. Appendix M contains mean anticipated and obtained subtest scores for the Missouri sample.

If the distribution of students who score significantly above and below their anticipated achievement equals that of the norm group, one would expect 10 per cent to score above their expected achievement and 10 per cent to score below. Positive trends result if more than 10 per cent score significantly above and/or less than 10 per cent score significantly below.

At each district classification, a significant percentage of students (greater than expected) performed above anticipated achievement. Greater numbers than would be expected also performed significantly below. Similar distributions occurred for both the Mechanics and Spelling subtests. However, more negative trends were apparent on the Language Expression subtest. Table III-10 indicates the percentages of students significantly above and below anticipated achievement for Language Total and an estimate of the total number of Missouri students expected to fall into these categories. Appendix P contains the percentages of Missouri Grade 6 students who were above and below anticipated achievement categorized by the Language subtests.

Table III-10

PERCENTAGES AND ESTIMATED NUMBERS OF STUDENTS IN MISSOURI SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 6 - Language

	% Above	% Below	No. Mo. Stu.*	Exp.** Above	Actual** Above	Exp.** Below	Actual** Below
A	18	13	9,900	990	1,782	990	1,287
AA	16	17	8,000	800	1,280	800	1,360
AAA	17	15	60,000	6,000	10,200	6,000	9,000
State	17	15	77,900	7,790	13,243	7,790	11,685
Norm	10	10					

*The figures in this column represent the number of Missouri students in September, 1970, and are rounded to the nearest 100.

**These numbers represent inferences made from the sample to the entire Missouri Grade 6 Population.

Language Summary

Data for three classifications in each of Grades 4 and 6 was presented from within three contexts. The first compared the achievement of the Missouri students to that represented by the nationwide norm. It was determined that for Grade 4 the students scored, on the average, a grade equivalent one month in advance of the norm group, while the sixth grade equaled the norm performance. The second method used to present the findings was to compare the achievement of the Missouri students to what would be expected of them, a concept referred to as "anticipated achievement comparisons." It was found that in Grades 4 and 6, the Missouri sample was, on the average, one month in excess of expectancy. In both grades, student performance from the

A schools measured two months in grade equivalent units ahead of expected. AAA students measured one month ahead and AA showed no deviation from the average anticipated score.

If the distribution of students in Missouri were like that of the norm group, 10 per cent would score significantly above anticipated achievement and 10 per cent would score significantly below. Positive trends would, therefore, be reflected in a Missouri distribution with more than 10 per cent scoring above and/or fewer than 10 per cent scoring below. On the other hand, negative results relative to the norm group would result with fewer than 10 per cent scoring above and/or more than 10 per cent scoring below. This was the third means for presenting the data.

In both Grades 4 and 6 at all classification levels, positive results occurred with a much larger percentage of students above anticipated achievement than expected. Within each level, however, negative trends were also apparent when too large a percentage of students performed below anticipation.
Table III-11 looks at each of the three modes of data presentation by district classification. Emphasis is given to strengths and problems of achievement within each group of students.

Table III-11

SUMMARY OF COMPARISONS
LANGUAGE

A. Missouri vs. Norm Group Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	1	1	1	1
Grade 6	-1	0	1	0

Note: Differences reported in number of months. Positive differences favor Missouri; negative differences favor the norm group.

B. Missouri Anticipated vs. Obtained Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	2	0	1	1
Grade 6	2	0	1	1

Note: Differences reported in number of months. Positive differences favor obtained over anticipated; negative differences favor anticipated over obtained.

C. Missouri vs. Norm -- Percentages ABOVE Anticipated Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	5	3	4	4
Grade 6	8	6	7	7

Note: Differences reported in percentages. Positive differences favor Missouri; negative differences favor the norm group.

D. Missouri vs. Norm -- Percentages BELOW Anticipated Achievement

	District Classification			
	A	AA	AAA	State
Grade 4	-2	-6	-3	-3
Grade 6	-3	-7	-5	-5

Note: Differences reported in percentages. Positive differences favor Missouri; negative differences favor the norm group.

STUDY SKILLS

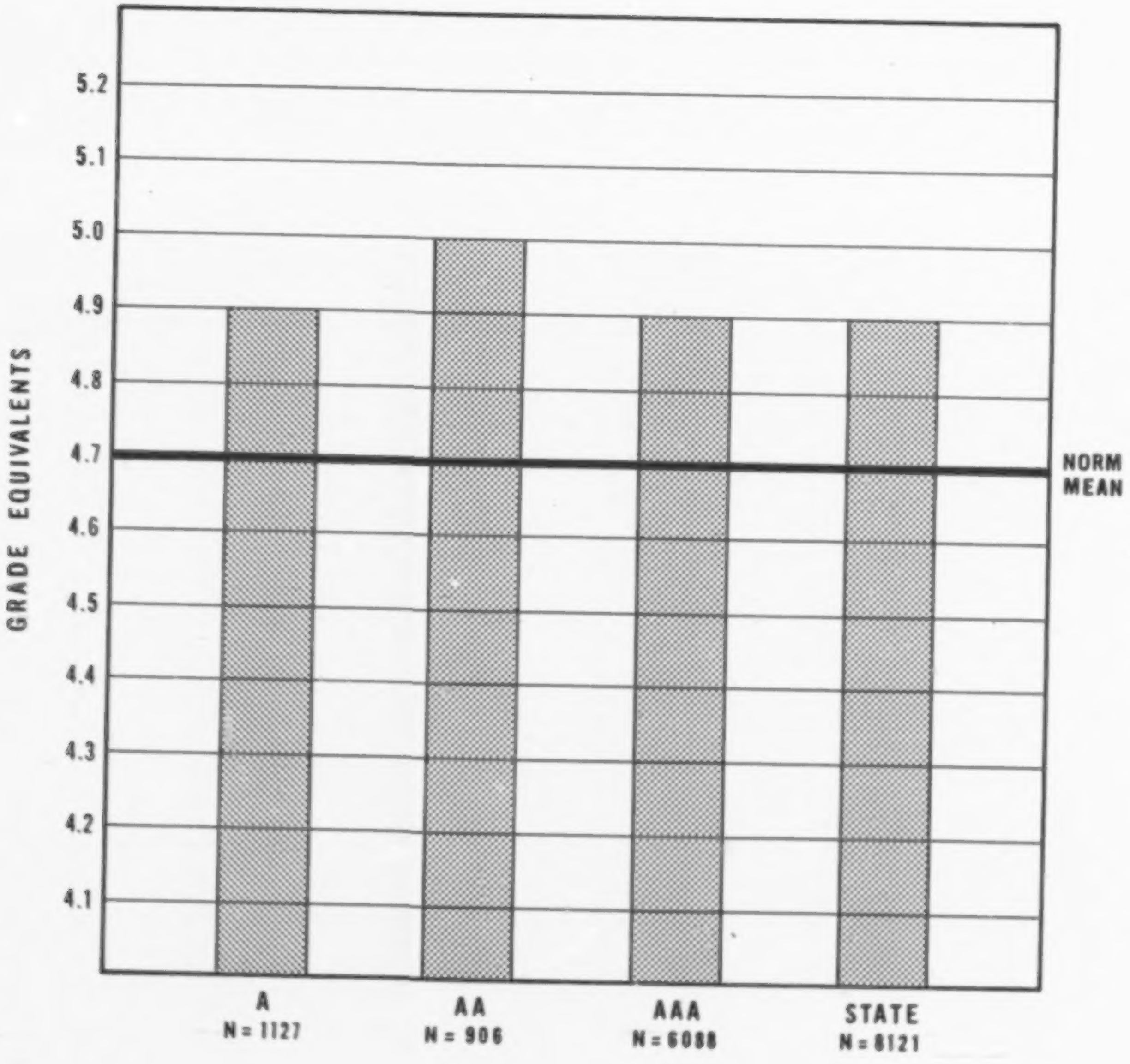
The CTBS Study Skills section is in two parts, Using Reference Materials (20 items) and Using Graphic Materials (30 items). The reference materials section involves availability of a library and the knowledge of its use, and scores could be highly affected by its absence in a school. The Graphics Materials test involves map reading and interpretation of diagrams, graphs, charts, and tables.

Grade 4

Figure III-19 shows that students, on the average, in each of the A, AA, and AAA schools scored above norm performance. The state exceeded norm scores by 2 months in grade equivalent units. Generally superior performances in the graph utilization section accounted for the positive picture. Average scores on the reference section by the AA and AAA schools matched the norm but were two months behind norm for the A schools.

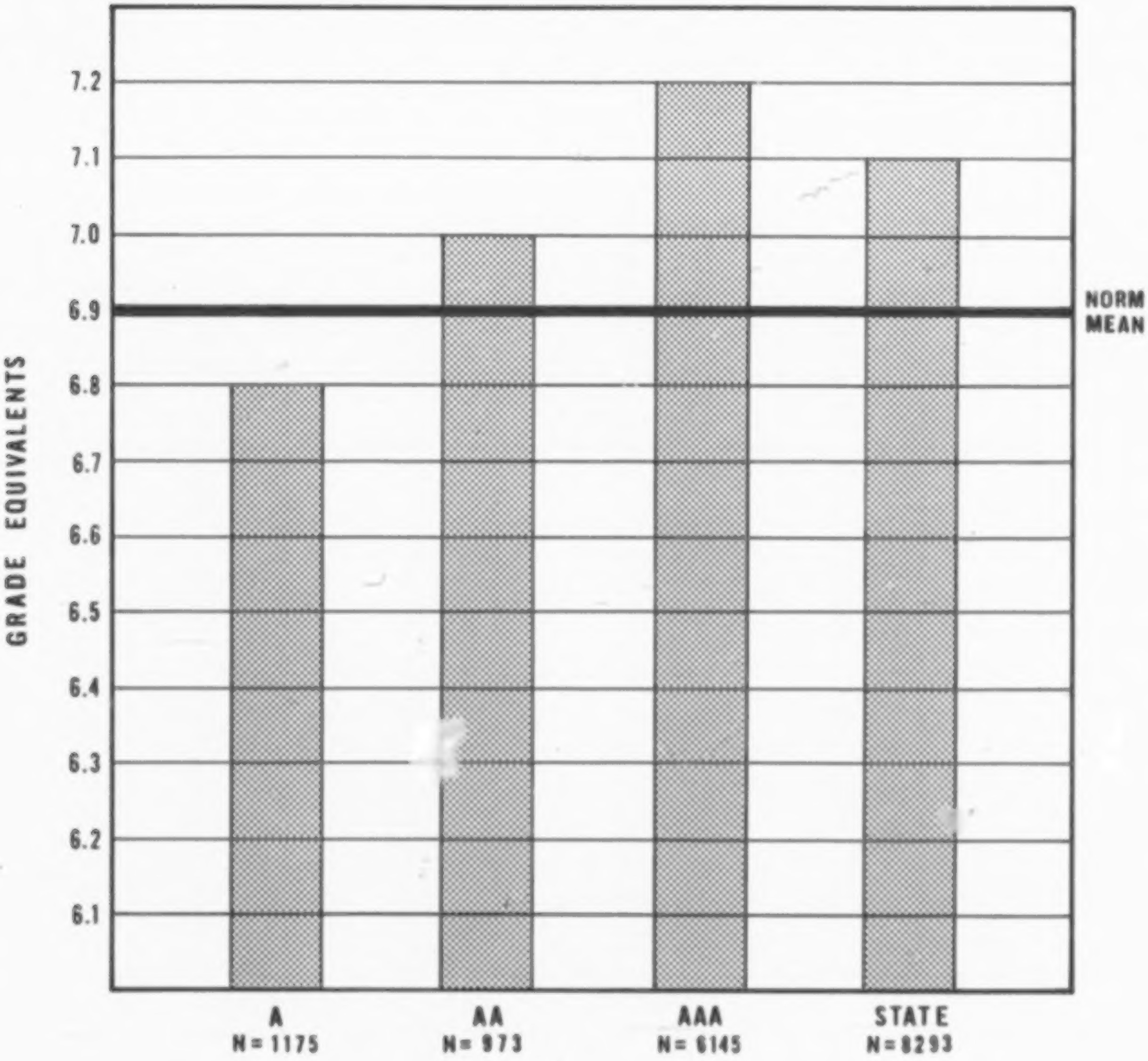
Grade 6

Figure III-20 depicts a stepladder effect for A, AA, and AAA schools in student performance on this subtest. On the average, the students in the A schools were one month behind norm performance; the AA students were one month in excess of the norm; while AAA students were, on the average, three months ahead of norm. Subtest contribution to the aforementioned Study Skills Total scores were most dramatic in the section covering reference materials. Average performance for students in the A schools was three months behind norm, while AA and AAA students exceeded the norm.



(N = Number of students participating)

FIGURE III-19. STUDY SKILLS TOTALS VS NORM MEAN (GRADE 4)



(N = Number of students participating)

FIGURE III-20. STUDY SKILLS TOTALS VS NORM MEAN (GRADE 6)

IDENTIFICATION OF POSSIBLE PROBLEM AREAS

A review of Section III of this document reveals that, generally, the Grade 4 and Grade 6 students are performing quite favorably relative to the norm group and to their own anticipated achievement. Data were analyzed from three different perspectives: 1) Missouri obtained achievement vs. norm achievement as reported by differences in mean grade equivalents; 2) Missouri obtained achievement vs. Missouri anticipated achievement as indicated by mean grade equivalents; and 3) percentages of Missouri students scoring significantly above and below their anticipated achievement vs. similar norm percentages. The major portion of the analysis was done according to Missouri school district classifications, A, AA, and AAA. Table III-12 shows that, relative to the norm group, the only possible problem was uncovered by the proportionately large number of students performing at a level below their anticipated achievement in Language. On the other hand, significant strengths appeared in fourth-grade Mathematics. Performances quite close to norm were recorded in Reading. However, some possible needs were identified as a result of analyzing subtest scores within each of the major subject areas. Some differences which could be a basis for ascertaining needs are noted below.

Reading

1. Grade 4 and 6 students outperformed the norm group by 2 months in Vocabulary but only equaled norm performance in Comprehension.

2. Only about half as many Grade 4 students were below anticipated achievement in Vocabulary as in Comprehension.

3. In Grade 6 about 13 per cent were below expectation in Comprehension, whereas only 9 per cent were below in Vocabulary.

Mathematics

1. Although in excess of norm, the Grade 4 application of mathematics knowledge to a practical situation is performed less well, on the average, than the Computation and Concepts tasks.

2. More AAA students than would be expected performed below anticipated achievement on the Computation subtest.

Language

1. In Grades 4 and 6 the Spelling subtest was performed much better than the Mechanics or Expression subtests.

2. For Grades 4 and 6 more students than would be expected were below anticipated achievement in the Expression subtest.

3. Grade 6 students from A classification schools were, on the average, 3 months behind norm on the Expression subtest.

Study Skills

1. Grade 4 schools averaged 2 months behind norm in the Using Reference Materials subtest.

2. Grade 6 students from A classification schools averaged 3 months behind norm in the Using Reference Materials subtest.

Table III-12

ANALYSIS SUMMARY

COMPARISONS OF:
1. Missouri Achievement to Norm Achievement
2. Missouri Achievement to Anticipated Achievement
3. Missouri Percentages Above and Below Anticipated Achievement to Norm Percentages

District Classification		Reading				Mathematics			
		Mo. vs. Norm 1	Mo. Ach. vs. Ant. 2	Mo. %ages vs. Norm 3		Mo. vs. Norm 1	Mo. Ach. vs. Ant. 2	Mo. %ages vs. Norm 3	
				Above	Below			Above	Below
Grade 4	A	0	+1	+1	+3	+4	+3	+6	+4
	AA	+2	+1	0	+4	+4	+3	+9	+5
	AAA	+1	+1	0	+2	+2	+2	+5	+3
	State	+1	+1	0	+2	+2	+2	+6	+4
Grade 6	A	-1	+1	+3	-2	0	+1	0	+1
	AA	0	-1	0	-1	+3	+2	+4	+2
	AAA	+1	+1	+3	0	0	0	-1	-1
	State	+1	+1	+2	-1	0	0	0	0

District Classification		Language				Study Skills
		Mo. vs. Norm 1	Mo. Ach. vs. Ant. 2	Mo. %ages vs. Norm 3		Mo. vs. Norm 1
				Above	Below	
Grade 4	A	+1	+2	+5	-2	+2
	AA	+1	0	+3	-6	+2
	AAA	+1	+1	+4	-3	+3
	State	+1	+1	+4	-3	+2
Grade 6	A	-1	+2	+8	-3	-1
	AA	0	0	+6	-7	+1
	AAA	+1	+1	+7	-5	+3
	State	0	+1	+7	-5	+2

Column 1 for each subject: These numbers represent differences in months between average grade equivalents for Missouri and Norm. A "+" favors Missouri.

Column 2 for each subject: These numbers represent differences in months between average grade equivalents for Missouri Obtained and Anticipated Achievement. A "+" favors Obtained.

Column 3 (above, below) for each subject: These numbers represent differences between Missouri and the Norm in percentages of students significantly above and below Anticipated Achievement. A "+" favors Missouri.

SECTION IV

ANALYSIS OF VARIABLES

SECTION IV - ANALYSIS OF VARIABLES

INTRODUCTION

The area of variable relationships relates school achievement to each of 33 items of school characteristic information. This was done by noting 1) the degree to which each characteristic is related to school means in Reading, Mathematics, and Language and 2) the possible relationships of each variable to the differences between anticipated and obtained achievement.

SCHOOL CHARACTERISTICS AND ACHIEVEMENT

As indicated in Section II, an initial set of 37 school characteristic variables was defined.[1] The purpose was to determine the degree to which relationships existed between mean school achievement and each of the variables. These relationships are discussed within two different contexts. The first utilizes correlation coefficients to specify how closely related achievement is to each characteristic. The second breaks each variable into levels and inspects the percentages of students who performed significantly above and below their anticipated achievement within each level.

Initial Variable Data

Information was collected from the files of the Missouri State Department of Education and questionnaires completed by 137 schools. A description of each variable is provided in Section II of this document. Tables IV-1 through IV-10 show the number of schools at each level for each variable.

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[1] Of the 37, one was eliminated for lack of variability (assistant principal), six were combined into one (degrees and experience into one teacher qualification index), and two were introduced (number of building specialists and number of district specialists). Thus, this discussion involves 33 variables.

Table IV-1

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO DISTRICT CLASSIFICATION

Class	Number Sch.
A	33
AA	18
AAA	86

Table IV-2

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO DISTRICT AND SCHOOL ENROLLMENT

District		School	
Enrollment	Number Sch.	Enrollment	Number Sch.
0-725	28	0-223	29
726-1500	27	224-335	27
1501-6000	27	336-495	27
6001-16750	28	496-675	27
ABOVE 16750	27	ABOVE 675	27

Table IV-3

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO TEACHER QUALIFICATION INDEX

Index*	Number Sch.
1.0-2.0	18
2.1-2.4	48
2.5-2.9	48
ABOVE 2.9	23

*Range of Index is from 1.0 (Least Qualified) to 4.0 (Most Qualified). See Section II for detailed discussion.

Table IV-4

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO NUMBERS OF DISTRICT AND BUILDING SPECIALISTS

District[1]		Building[2]	
No. Specialists	No. Schools	No. Specialists	No. Schools
0	19	0-2	17
1	20	3-5	94
2	61	6-8	26
3	17		
4	20		

[1] Those considered were available: (1) Social Workers, (2) Psychologists, (3) EMR Program, (4) Speech Therapist.

[2] Those considered were available, certificated: (1) Guidance Personnel, (2) Nurse, (3) Librarian, (4) A. V. Coordinator, (5) Art Teacher, (6) Music Teacher, (7) P. E. Teacher, (8) Assistant Principal.

Table IV-5

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO STUDENT/TEACHER RATIO

Ratio to 1	Number Sch.
Less than 20.0	19
20.0-24.9	52
25.0-29.9	38
30.0-34.9	18
Greater than 34.9	10

Note: The average for all 137 schools = 25.6.

Table IV-6

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO ADJUSTED VALUATION PER CHILD AND PER STUDENT EXPENDITURE

Adjusted Valuation Level	No. Sch.	Per Student Expenditure Level	No. Sch.
Less than $5,250	29	Less than $557	19
$5,251-9,000	45	$558-690	53
$9,001-13,000	41	$691-830	52
Greater than $13,000	22	Greater than $830	12

Table IV-7

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO HOURS PER WEEK BY THREE BUILDING SPECIALISTS

Hours	Guidance	Nurse	Librarian
0	88	31	63
1-15	24	56	38
16-30	16	42	19
Over 30	9	8	17

Table IV-8

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO AVAILABILITY OF SPECIAL PERSONNEL OR PROGRAMS

Personnel/Program	No. Schools Yes	No
A. V. Coordinator	29	108
Social Worker	32	105
Psychologist	31	106
Certificated Art Teacher	72	65
Certificated Music Teacher	122	15
Certificated P. E. Teacher	110	27
Title I Program	86	51
EMR Program	109	28
Speech Therapy Program	101	36
Pre-kindergarten Program	10	127
Kindergarten Program	125	12

Table IV-9

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO THEIR MAJOR PRIMARY AND INTERMEDIATE CLASSROOM ORGANIZATION

Organization	Primary	Intermediate
Graded Self Contained	102	103
Graded Departmental	4	25
Non-graded Self Contained	25	6
Non-graded Departmental	3	3

Note: Primary does not equal 137 as not all schools had primary grades.

Table IV-10

NUMBER OF SCHOOLS IN THE MISSOURI SAMPLE ACCORDING TO HOURS AND CERTIFICATION OF BUILDING PRINCIPAL

Hours as Principal	No. Schools	Certificated Principal	No. Schools
1-14	26	Yes	112
15-29	18	No	25
Full Time	93		

Correlational Analysis

A correlation coefficient (of which there are several types) is an index ranging from 0 to 1, positive or negative, indicating the degree of relationship between two sets of variables. A "0" indicates no relationship, whereas a "1" or "-1" indicates a perfect relationship. A positive correlation indicates a direct relationship. (As one variable increases, the other increases.) A negative correlation denotes an inverse relationship. (An increase in one variable is accompanied by a decrease in the size of the other variable.) Of primary interest in this assessment is the possible determination of relationships between the independent variables (school characteristics information) and the dependent variables (test scores). Table IV-11 presents coefficient ranges and their descriptors of relationship potential.

Table IV-11

RANGES OF CORRELATION COEFFICIENTS

Range	Descriptor
±(.80-1.0)	very high relationship
±(.50-.80)	moderately high relationship
±(.30-.50)	moderate relationship
±(.20-.30)	low but existent relationship
+(0-.20)	little more than a chance relationship

Understandably, these descriptions may not be acceptable to some statisticians. However, they should suffice to satisfy the intent of this discussion. Table IV-12 shows the degree of relationships between each of the variables and the Reading, Mathematics, and Language Total scores for each grade.

Relationship Considerations

Before studying Table IV-12, it is essential that the reader refrain from implying a cause-and-effect relationship. For example, the table indicates a ±.25 correlation between Grade 4 Reading Totals and the existence of certificated music teachers in the schools. This implies that there is a tendency for schools who have certificated music teachers to have higher mean

Reading scores in Grade 4. It would be highly inaccurate to conclude that music teachers in the schools caused higher reading achievement. Correlations indicate degree of relationship only. Further study under tightly controlled experimental conditions would be necessary before drawing conclusions related to cause. These data report only existing conditions within a sample of from 120 to 130 schools.

A further consideration is the fact that correlations become rather meaningless when there exists such a poor split on levels of a variable that, for example, 95 per cent of the schools have the same level for the variable with only 5 per cent deviating. Although not broken down by grades, Table IV-8 shows this to be true for availability or non-availability of kindergarten or pre-kindergarten programs. Also, there were not enough schools reporting certain types of classroom organizations to gain much information. Only four schools reported graded departmental units for the primary grades. Likewise, six reported non-graded, self contained units, and only three for both primary and intermediate non-graded, departmental units.

Table IV-12

CORRELATION COEFFICIENTS
BETWEEN SCHOOL CHARACTERISTIC
DATA AND TOTAL SCORES ON
READING, MATHEMATICS, AND LANGUAGE TESTS

Grade 4 (N = 129)   Grade 6 (N = 120)

Variable	Reading		Mathematics		Language	
	4	6	4	6	4	6
A = 1, AA = 2, AAA = 3	.15	.13	-.06	-.03	.08	-.03
District Enrollment	-.36	-.28	-.48	-.34	-.35	-.34
School Enrollment	-.02	-.04	-.17	-.16	-.05	-.16
Teacher Qualification Index	.20	.07	.32	.16	.24	.16
Student/Teacher Ratio	-.27	-.29	-.36	-.29	-.26	-.29
Adjusted Valuation per Child	-.04	.16	-.02	.12	.02	.12
Per Student Expenditure	-.07	.13	-.12	.04	-.04	.04
Guidance Hours per Week	.17	.16	.08	.09	.16	.09
Nurse Hours per Week	-.03	-.05	-.09	-.13	-.01	-.13
Librarian Hours per Week	.12	.04	.05	.06	.10	.06
A. V. Coordinator (1) or Not (0)*	-.15	-.28	-.09	-.24	-.16	-.24
Social Worker (1) or Not (0)	-.30	-.19	-.44	-.31	-.32	-.31
Psychologist (1) or Not (0)	-.27	-.08	-.35	-.15	-.26	-.15
Number of Building Specialists	.22	.11	.06	.00	.19	.00
Number of District Specialists	-.15	-.05	-.35	-.20	-.21	-.20
Title I Program (1) or Not (0)	-.21	-.23	-.07	-.08	.12	-.08
Certificated Art Teacher (1) or Not (0)	.10	.07	.19	.12	.21	.12
Certificated Music Teacher (1) or Not (0)	.25	.16	.30	.16	.26	.16
Certificated P. E. Teacher (1) or Not (0)	.00	-.02	.06	.05	.04	.05

Table IV-12 (Continued)

Variable	Reading		Mathematics		Language	
	4	6	4	6	4	6
EMR Program (1) or Not (0)	-.18	-.13	-.17	-.04	-.04	-.04
Speech Therapy Program (1) or Not (0)	-.03	.04	.09	.18	.17	.18
Pre-Kindergarten Program (1) or Not (0)	-.06	-.06	-.03	.00	-.06	.00
Kindergarten Program (1) or Not (0)	.13	.15	.04	.06	.13	.06
Grades 1, 2, 3 Primarily Graded Self Contained (1) or Not (0)	.20	.08	.25	.14	.24	.14
Grades 1, 2, 3 Primarily Graded Departmental (1) or Not (0)**	-.03	.06	-.13	-.02	-.04	-.02
Grades 1, 2, 3 Primarily Non-Graded Self Contained (1) or Not (0)	-.23	-.17	-.24	-.25	-.28	-.25
Grades 1, 2, 3 Primarily Non-Graded Departmental (1) or Not (0)	.09	.13	.07	.09	.05	.09
Grades 4, 5, 6 Primarily Graded Self Contained (1) or Not (0)	-.23	-.27	-.19	-.19	-.22	-.19
Grades 4, 5, 6 Primarily Graded Departmental (1) or Not (0)	.16	.24	.09	.14	.18	.14
Grades 4, 5, 6 Primarily Non-Graded Self Contained (1) or Not (0)	.14	.15	.19	.15	.09	.15
Grades 4, 5, 6 Primarily Non-Graded Departmental (1) or Not (0)**	.06	-.03	.04	.00	.03	.00
Principal Certificated (1) or Not (0)	.14	.10	-.06	-.08	.07	-.08
Hours as Principal in the School	.12	.12	-.08	-.02	.05	-.02

*Twenty of those variables are dichotomies, i.e., either a value of 1 or 0. The 1's and 0's in parentheses indicate in which direction the dichotomy was coded.

**Sample sizes too small to draw any conclusion about existent relationship

Conclusions

A review of Table IV-12 reveals that there exists very little relationship at either grade between achievement and a vast majority of the variables under study. The largest correlations in the table (of which there are few) could be considered as having little more than a moderate relationship with school achievement scores. Nevertheless, the data would support the following statements:

1. Little, if any, relationship exists between achievement and district classification. However, there is a definite trend for those schools that are part of the larger districts to score less well.
2. At Grade 4, there is a tendency for those schools with higher teacher qualification indices to produce higher achievement.
3. There is a trend for schools whose student/teacher ratio allows for somewhat smaller classes to have higher achievement.
4. The amount of money spent per student is not related to achievement.
5. Little relationship exists between school achievement levels and the number of supportive services offered in the schools (although slightly positive with Grade 4 Reading scores).
6. Negative correlations, especially at Grade 4, exist between those schools having access to social workers and psychologists and the building achievement level. This indicates that those schools with these services available tend to have lower achievement levels.
7. Relative to major classroom organization within buildings, the following slight tendencies were indicated:

a. Those buildings with graded, self contained units at the primary levels tend to be those with higher fourth-grade achievement levels. (Of the 137 sampled schools, 102 were in this category.)

b. The 25 schools indicating that their primary levels were of non-graded, self contained nature tended to do less well than the others.

c. There were 103 schools which specified that the main organizational unit at the intermediate grades was the graded, self contained unit. These tended to do less well than the others.

The above statements were based upon rather low but existent correlation levels. In summary, the conclusion may be drawn that the majority of school characteristic variables studied in this assessment do not have a relationship to the level of school achievement.

SCHOOL CHARACTERISTICS AND ANTICIPATED ACHIEVEMENT

The previous discussion dealing with school characteristics and achievement was approached from an investigation of correlation between each characteristic and mean school achievement level. This section investigates each level of a school variable to determine if trends may exist as to the percentage of Missouri students performing significantly above and below their anticipated achievement. For each variable, percentages based on the *statewide* sample are presented for Grades 4 and 6 in each subject, and *significant* departures from these percentages are noted. (A similar caution against over-generalizing or inferring cause-and-effect from these data must be exercised.)

District Enrollment

READING

	Above	Below
Grade 4	10%	8%
Grade 6	12%	11%

The only significant departure from the state distribution is in sixth grade, where in districts of 1,501 to 6,000 student population, the distribution was 14 per cent above and 7 per cent below anticipated achievement. In the sample there were 1,842 students in this group.

MATHEMATICS

	Above	Below
Grade 4	16%	6%
Grade 6	10%	10%

Significant departures from the state distributions occurred at both Grades 4 and 6. In Grade 4 only 9 per cent of the students in districts with a student population of over 16,750 (N = 1,950) were above, whereas 9 per cent were below. These figures represent negative seven and three per cent differences respectively for this group. Likewise, at Grade 4, students in the smaller districts up to 6,000 (N = 2,896) averaged greater than 16 per cent above (about 18.5%) and slightly less than 6 per cent below. In Grade 6, only seven per cent of the students in districts with greater than 16,750 enrollment (N = 2,019) were significantly above anticipated achievement compared with

10 per cent from the state. Of those in districts with enrollments from 725 to 1,500 (27 schools with N = 1,842) 14 per cent were above, 4 per cent above the state as a whole. Otherwise, no significant trends were apparent.

LANGUAGE

	Above	Below
Grade 4	14%	13%
Grade 6	17%	15%

In Grade 4, the only significant departure is a 16 per cent below figure registered by those in districts from enrollments of 6,000 to 16,750 (N = 1,815).

Medium size districts in Grade 6 had a rather unusual pattern. In districts from 1,501 to 6,000 enrollments (N = 1,842), 19 per cent were above and only 12 per cent below (compared to a state distribution of 17 per cent above and 15 per cent below). However, students in districts with enrollments from 6,000 to 16,750 (N = 2,013) registered 14 per cent above and 19 per cent below anticipated achievement, a significant negative departure from the state distribution. Twenty-eight schools from the total sample of 137 were in this category. Otherwise, no significant trends were apparent.

School Enrollment

READING

	Above	Below
Grade 4	10%	8%
Grade 6	12%	11%

No level of school enrollment departed to any significant degree from 10 per cent above/8 per cent below figures at Grade 4. In Grade 6, the only deviation worthy of mention was a three per cent positive difference with 8 per cent of the 1,271 students in schools with a 335-495 enrollment who scored below anticipated achievement.

MATHEMATICS

	Above	Below
Grade 4	16%	6%
Grade 6	10%	10%

There was a tendency among Grade 4 students in schools with a smaller enrollment (up to 335) to rank higher than the state figure of 16 per cent above anticipated achievement and slightly lower than 6 per cent below. (Of 1,611 students, about 18.5 per cent were above and 4.5 per cent were below.) Otherwise no significant trends were apparent and no significant deviations were observed in the sixth grade.

LANGUAGE

	Above	Below
Grade 4	14%	13%
Grade 6	17%	15%

The only figure that differed in excess of 2 percentage points from the state figures displayed above was in sixth grade where only 12 per cent of the students in schools with enrollments from 335-495 (N = 1,271) were below their anticipated scores.

Teacher Qualifications - Amount of Education and Experience

READING

	Above	Below
Grade 4	10%	8%
Grade 6	12%	11%

No significant departures from the above figures were apparent within the levels of the teacher qualification index for schools for either Grade 4 or Grade 6.

MATHEMATICS

	Above	Below
Grade 4	16%	6%
Grade 6	10%	10%

There was a definite trend at Grade 4 for a larger percentage of students in schools with a higher teacher qualification index to score above anticipated achievement. In the four levels from highest qualified buildings to the lowest qualified buildings (relative to amount of education and experience) the percentages above anticipated achievement ranged from 20 to 12 per cent with a state average of 16 per cent. Otherwise, no significant trends were observed in the fourth or sixth grade.

LANGUAGE

	Above	Below
Grade 4	14%	13%
Grade 6	17%	15%

At Grade 4 only 11 per cent of the 664 students in buildings with lowest teacher qualification indices were above anticipated achievement (note the very small sample size, however). Otherwise, no significant trends were apparent.

Student/Teacher Ratio

READING

	Above	Below
Grade 4	10%	8%
Grade 6	12%	11%

There were 1,727 students from 28 buildings which were reported to have a ratio greater than 30:1. In Grade 4, seven per cent of the students in these buildings were above anticipated achievement (as opposed to the 10% reported above for the state as a whole).

In Grade 6, however, slightly larger than expected percentages of the 1,576 students in the 28 buildings with the large student/teacher ratios were above anticipated achievement. This group registered almost 15 per cent above. These were the only significant trends observed.

MATHEMATICS

	Above	Below
Grade 4	16%	6%
Grade 6	10%	10%

Definite trends appeared here as only 10 per cent of the 1,728 Grade 4 students in buildings with high student/teacher ratios performed above anticipated compared to 17 per cent of the others. This trend did not occur at Grade 6. However, in the 18 buildings for Grade 6 with a ratio of from 30:1 to 35:1 (N = 1,176) only 6 per cent were below compared to a state figure of 10 per cent below. Otherwise, no significant trends were observed.

LANGUAGE

	Above	Below
Grade 4	14%	13%
Grade 6	17%	15%

Those Grade 4 students in buildings with a ratio greater than 30:1 had proportionately fewer students above anticipated achievement than did the others (11% to 15%). The 1,176 Grade 6 students in the 18 schools with a ratio between 30:1 and 35:1 recorded only 12 per cent below rather than the 15 per cent reported for the state. Otherwise, no significant trends were apparent.

Adjusted Valuation per Student

No significant trends were discovered in Reading, Mathematics, or Language at either grade level among the levels for this variable.

Per Student Expenditure

No significant trends were discovered in Reading, Mathematics, or Language at either grade level among the levels for this variable.

Number of In-Building Specialists

(See Table IV-4 for description.)

READING

	Above	Below
Grade 4	10%	8%
Grade 6	12%	11%

No trends were apparent at either grade level.

MATHEMATICS

	Above	Below
Grade 4	16%	6%
Grade 6	10%	10%

Although the sample size was very small (N = 516) for the 17 buildings with fewer than three building specialists, 13 per cent of the sixth-grade students were above anticipated achievement and 7 per cent were below compared with state figures of 10 per cent above and below. These were the only significant deviations from state totals in either grade.

LANGUAGE

	Above	Below
Grade 4	14%	13%
Grade 6	17%	15%

No trends were apparent at Grade 4. However, at Grade 6 (of those 516 students in buildings with fewer than 3 specialists), 20 per cent were above and 12 per cent were below compared to the state distributions of 17 per cent and 15 per cent respectively. This, too, represents a very small sample size. Otherwise, no significant trends were noted.

Number of District Specialists

(See Table IV-4 for description)

READING

	Above	Below
Grade 4	10%	8%
Grade 6	12%	11%

Twenty school buildings reported having access to the maximum number of four district specialists (social workers, psychologists, speech therapists, and specialists in working with the mentally retarded). In these buildings there were 1,400 Grade 4 students. Of these, only 7 per cent performed above anticipated achievement as compared to 10 per cent for the state as a whole. In Grade 6, however, those students in these same buildings recorded only

8 per cent below anticipated achievement (compared with 11 per cent for the state). No other significant deviations from the state totals were observed.

MATHEMATICS

	Above	Below
Grade 4	16%	6%
Grade 6	10%	10%

Definite trends appeared in buildings where all four district specialists were available. This group had far lower percentages above anticipated achievement than would be expected (7 per cent vs. 16 per cent for the state). Likewise, 9 per cent were below anticipated compared with an overall state percentage of 6 per cent. The trend is for the percentages above expectancy to increase with the fewer district specialists available. However, in three of the five categories for this variable (numbers of district specialists) the total sample size is under 1,000, with numbers of schools being 20 or less. Otherwise, no significant trends were noted.

LANGUAGE

	Above	Below
Grade 4	14%	13%
Grade 6	17%	15%

The same trend appears with Grade 4 Language as with Reading and Mathematics, where only 9 per cent of the students having access to four district specialists were above expected achievement compared with 14 per cent for the state. In Grade 6, only 11 per cent of the 1,181 students with access to the four specialists were below anticipated achievement compared with 15 per cent for the state. However, 3 per cent more than expected were below at the level where three specialists were available. At the subsequent levels, figures are more typical of those obtained from the state totals. No other significant trends were noted.

The remaining 24 variables describing school characteristics generally deal with 1) availability or not of specific types of personnel or programs, and 2) types of classroom organizations within each school. Rather than present a discussion of anticipated achievement for each subject area for the levels of each variable, a more general presentation follows, pointing out some trends (although not well-defined) for these two general types of variables.

Personnel Types

Information was collected from schools relative to the availability of special personnel in the areas of guidance, school nursing, library, audio-visual, social work, and psychology, plus certificated teachers in art, music, and physical education. Also collected was information concerning the hours spent in the building as a principal and whether or not the principal was certificated at the elementary schools. Tables IV-7, IV-8, and IV-10 indicate the number of schools reporting these personnel data.

As indicated earlier, when schools are divided according to whether or not such personnel are available and percentages then computed of those students above and below anticipated achievement in each category, the results are sketchy at best. Very little deviation occurs from the percentages reported for the whole state. In most instances when there is a difference, the group is so small (for example, less than 1,000) that to report a percentage of the total refers to a very small number of students. With these factors considered, the following statements are made as a result of this analysis:

1. Of the 741 Grade 6 students in buildings with a full-time counselor, the percentages of students above anticipated achievement exceeded the state percentages in Reading by 5 percentage points, in Mathematics by 7 percentage points, and in Language by 3 percentage points. Percentages below anticipated achievement were less than would be expected by state totals by about 4 percentage points in Reading and Mathematics.
2. A lesser percentage of students than would be expected from state totals scored above anticipated achievement in Mathematics in districts with available social workers and psychologists in both Grades 4 and 6; however, it was more dramatic in Grade 4. The same was true in Language at Grade 4.
3. Those Grade 6 students in buildings with no certificated art teacher and/or music teacher recorded a lesser percentage of students below anticipated achievement than the state totals have indicated.

Other than the above-mentioned distributions of students significantly above or below anticipated achievement, no further differences were noted. In summary, it is fair to conclude that the demographic variables indicating the availability of special personnel in the buildings had very little relationship to the percentages of students scoring above or below anticipated achievement.

Special Programs

Information relating to the availability of special programs in speech therapy, mental retardation, pre-kindergarten, and kindergarten was collected from each school. Table IV-8 shows the number of schools which offer such programs. The existence of a Title I program in each building was also determined. With but one small exception, distributions of students above and below anticipated achievement closely paralleled those of the total state sample. Twenty-eight buildings with an enrollment of 999 students reported no EMR program. In Mathematics and Language at Grade 4 within this group, the percentage of students who were above anticipated achievement was somewhat in excess of the state totals. Twenty-one per cent were above in Mathematics (state total was 16%) and 17 per cent were above in Language (state total was 14%).

Major Classroom Organization

Each school responded as to their major method of classroom organization at the primary and intermediate grades. Choices afforded the respondents were: 1) graded, self contained; 2) graded, departmental; 3) non-graded, self contained; and 4) non-graded, departmental. Table IV-9 shows the number of schools with each type of organization, and it will be noted that several types lacked sufficient response to justify an analysis. Therefore, this discussion shall center on 1) the graded, self contained units, 2) the graded, departmental unit at the intermediate level, and 3) the non-graded, self contained unit at the primary level.

Graded, Self Contained (Primary)

A total of 5,328 students in the Grade 4 sample attended schools in which the major classroom organizational type at the primary level was the graded, self contained unit. There were 2,333 fourth-grade students in buildings with other types of classroom organization. In the sixth grade there were 4,831 students in buildings where the classroom organization was basically graded, self contained. Buildings whose organization at the primary level was something other than graded, self contained, enrolled 3,080 sixth graders. Table IV-13 shows the comparison of the percentage of students above and below anticipated achievement for each of these groups in the three subject areas.

Table IV-13

PERCENTAGES OF 4th AND 6th GRADERS
ABOVE AND BELOW ANTICIPATED ACHIEVEMENT
ACCORDING TO WHETHER GRADED, SELF CONTAINED OR NOT
AT THE PRIMARY LEVELS

		Grade 4			Grade 6		
		Read.	Math.	Lang.	Read.	Math.	Lang.
Above Ant. Ach.	Graded Self Cont.	11%	16%	17%	12%	11%	15%
	Other	9%	14%	17%	13%	9%	12%
Below Ant. Ach.	Graded Self Cont.	7%	7%	15%	12%	10%	14%
	Other	7%	7%	14%	10%	9%	12%
		Graded S. C., N = 5,328 Other N = 2,333			Graded S. C., N = 4,831 Other N = 3,080		

Table IV-13 reveals very little difference between the percentages recorded for the students in the two organizational types. However, a review of percentages above anticipated achievement reveals a slight trend in favor of schools with self contained units. Conversely, a review of percentages below anticipated achievement reveals a slight trend in favor of other organizational types.

Graded, Self Contained (Intermediate)

In Table IV-14, the percentages of students who scored above and below anticipated achievement in graded, self contained organizational units are compared against those students in other organizational types.

Table IV-14

PERCENTAGES OF 4th AND 6th GRADERS
ABOVE AND BELOW ANTICIPATED ACHIEVEMENT
ACCORDING TO WHETHER GRADED, SELF CONTAINED OR NOT
AT THE INTERMEDIATE LEVELS

		Grade 4			Grade 6		
		Read.	Math.	Lang.	Read.	Math.	Lang.
Above Ant. Ach.	Graded Self Cont.	10%	14%	14%	13%	11%	17%
	Other	12%	19%	15%	11%	9%	17%
Below Ant. Ach.	Graded Self Cont.	7%	7%	13%	11%	8%	14%
	Other	7%	7%	14%	11%	12%	16%
		Graded S. C., N = 5,658 Other N = 2,003			Graded S. C., N = 5,259 Other N = 2,652		

According to the percentages presented in this table, the tendency is for a proportionately higher number of students at Grade 4 to score above anticipated if the school they attend has an organizational structure at the intermediate grades other than graded, self contained. The trend tends to slightly reverse itself at Grade 6, though the percentages are very close. Other than at Grade 6 (where the percentages for graded, self contained units are slightly favorable) no difference occurs in the distributions of students below anticipated achievement in Mathematics and Language.

Graded, Departmental (Intermediate)

There were 25 schools in the sample reporting this type of classroom organization at the intermediate levels. In Table IV-15 the percentages for students above and below anticipated achievement in graded departmental units are compared against the percentages for students in other organizational types.

Table IV-15

PERCENTAGES OF 4th AND 6th GRADERS
ABOVE AND BELOW ANTICIPATED ACHIEVEMENT
ACCORDING TO WHETHER GRADED, DEPARTMENTAL
OR NOT AT THE INTERMEDIATE LEVELS

		Grade 4			Grade 6		
		Read.	Math.	Lang.	Read.	Math.	Lang.
Above Ant. Ach.	Graded Dept.	12%	18%	17%	11%	9%	17%
	Other	10%	15%	13%	13%	11%	17%
Below Ant. Ach.	Graded Dept.	8%	8%	15%	11%	12%	15%
	Other	7%	7%	13%	11%	9%	15%

Grade 4: Graded Dept., N = 1,305
Other N = 6,356

Grade 6: Graded Dept., N = 2,082
Other N = 5,829

These figures show that there is a tendency for schools with graded, departmental units at the intermediate levels to have slightly higher percentages of Grade 4 students above anticipated achievement than schools with other type organizations. This tendency is not apparent for the numbers below anticipated achievement. Nor does the trend occur at Grade 6. In fact, in Grade 6 Mathematics, the reverse is true.

Non-Graded, Self Contained (Primary)

There were 25 schools in the sample reporting this type of classroom organization at the primary levels. In Table IV-16, the percentages for students above and below anticipated achievement in non-graded, self contained units are compared against the percentages for students in other organizational types.

Table IV-16

PERCENTAGES OF 4th AND 6th GRADERS
ABOVE AND BELOW ANTICIPATED ACHIEVEMENT ACCORDING TO
WHETHER NON-GRADED, SELF CONTAINED OR NOT
AT THE PRIMARY LEVELS

		Grade 4			Grade 6		
		Read.	Math.	Lang.	Read	Math.	Lang.
Above Ant. Ach.	Non-Graded Self Cont.	9%	13%	11%	14%	9%	17%
	Other	11%	16%	15%	12%	11%	17%
Below Ant. Ach.	Non-Graded Self Cont.	6%	7%	12%	8%	8%	13%
	Other	7%	7%	14%	12%	10%	15%
		N.G., Self Cont. N = 1,865 Other N + 5,796			N.G., Self Cont. N = 1,802 Other N = 6,109		

Two apparent trends are indicated from Table IV-16. The first is that fewer fourth-grade students than would be expected scored above their anticipated achievement (if from schools whose organizational unit at the primary grades was non-graded, self contained). On the other hand, proportionately fewer of these scored below anticipated achievement at the sixth-grade level.

SECTION V

SUMMARY

SECTION V - SUMMARY

PURPOSE OF THE PROJECT

The purpose of this project was two-fold: 1) to determine the status of Reading, Language, Mathematics, and Study Skills in the state as recorded by sampling fourth- and sixth-grade students in selected school districts and buildings, and 2) to identify those educational factors which are subject to impact by SDE funding or regulation and which require attention to improve educational opportunities for Missouri elementary students.

STUDY DESIGN

Instruments. Two instruments were administered concurrently to acquire the data needed for this assessment: 1) the *Comprehensive Tests of Basic Skills (CTBS)*, and 2) the *Short Form Test of Academic Aptitude (SFTAA)*.

Sample. The design of the study stipulated that at least 10 per cent of the fourth- and sixth-graders in at least 8 per cent of the Missouri elementary schools were to be selected as the sample for this study. Actual sample size very closely approximated this criteria. Schools were randomly selected within two para meters: 1) district classification (A, AA, and AAA), and 2) relative size (large, medium, and small) of the districts within each classification.

Procedures. The project was announced to state educators and the public by the Missouri State Department of Education. A local representative was designated in each district to handle all on-site aspects of the project. A total of ten workshops were conducted for SDE and local personnel by the CTB/McGraw-Hill evaluation consultant prior to the testing.

Variables. Fourteen dependent variables were derived from subtest scores on the CTBS and three independent variables from individual student scores on the SFTAA. Twelve independent variables were derived from data provided by the SDE and twenty-five additional independent variables related to the selected schools were obtained on questionnaires processed through the designated local representatives.

Limitations. Certain statistical limitations to the conclusions made of this assessment are identified and stated in Section II of this document.

DATA ANALYSIS - READING

General. The CTBS Reading Test is divided into two parts: Vocabulary and Comprehension. Three scores are reported, one for each part and a Reading Total score. These scores were obtained from 8,117 fourth graders and 8,035 sixth graders.

Grade 4 Reading. In terms of grade equivalent units, the performance of Missouri students compares favorably with the normative mean. In terms of percentile points, the distributions for the norm group and for the Missouri students in Reading very closely resemble each other, except that there were proportionately fewer very low scores in the Missouri sample. In the area of anticipated achievement, Missouri students compared favorably with the norm of 10 per cent above and below. On the average, Missouri fourth graders performed one month in advance of their anticipated achievement.

Grade 6 Reading. In terms of grade equivalent units, Missouri sixth graders performed slightly above the normative mean. In terms of percentile rank, Missouri sixth graders demonstrated a more homogeneous distribution in

Total Reading than the norm group. The distribution of Missouri students generally paralleled that of the norm group. Twelve per cent of the Missouri sixth graders scored significantly above their anticipated achievement and eleven per cent scored significantly below (as compared with norms of 10 per cent for each category).

DATA ANALYSIS - MATHEMATICS

General. The CTBS Arithmetic Test is divided into three parts: Computation, Concepts, and Applications. Scores for each of these tests are reported in addition to an Arithmetic Total. These scores were obtained from 8,034 fourth graders and 8,266 sixth graders.

Grade 4 Mathematics. In terms of grade equivalent units, the performance of Missouri fourth graders surpassed the norm group by two months. In terms of percentile points, Missouri presented a very positive distribution relative to normative performance. The superior performance of Missouri fourth graders in Mathematics was also reflected in the area of anticipated achievement where they scored, on the average, two months in excess of expectations. Sixteen per cent scored significantly above and only six per cent scored significantly below anticipated achievement against a norm of 10 per cent above and below.

Grade 6 Mathematics. In terms of grade equivalent units, Missouri sixth graders matched or exceeded the performance of the norm group. Missouri students as a whole exactly matched the norm group in the distribution of those performing significantly above and below anticipated achievement (10%). Missouri students' obtained achievement also matched their anticipated achievement.

DATA ANALYSIS - LANGUAGE

General. The CTBS Language Test is divided into three parts: Mechanics, Expression, and Spelling. Scores for each of these tests is reported in addition to a Language Total. These scores were obtained from 8,076 fourth graders and 8,292 sixth graders.

Grade 4 Language. In terms of grade equivalent units, the performance of Missouri fourth graders exceeded normative achievement by one month. In terms of percentile points, the distribution of Missouri students was slightly favorable to that of the norm. They also performed an average of one month ahead of their anticipated achievement. More Missouri students (14%) than the norm (10%) performed significantly above anticipated achievement. However, a greater percentage (13%) than the norm (10%) performed significantly below anticipated achievement.

Grade 6 Language. Missouri students exactly matched the performance of the norm group in terms of grade equivalent units. Seventeen per cent of the Missouri sixth graders scored significantly above their anticipated achievement as compared with the norm group (10%). However, 15 per cent of the Missouri sample scored significantly below their anticipated achievement as compared with the norm of 10 per cent. On the average, Missouri sixth graders exceeded their own anticipated achievement by one month.

DATA ANALYSIS - STUDY SKILLS

General. The CTBS Study Skills section is in two parts: Using Reference Materials, and Using Graphic Materials. Scores in Study Skills were obtained from 8,121 fourth graders and 8,293 sixth graders.

Grades 4 and 6 Study Skills. The state as a whole exceeded normative scores by two months in grade equivalent units for both grades.

POSSIBLE PROBLEM AREAS

Generally, Missouri fourth- and sixth-grade students performed quite favorably relative to the norm and to their own anticipated achievement. A review of subtest scores reveals certain possible needs or problem areas. To varying degrees, these are: 1) Reading Comprehension, where both grades showed weaknesses as compared with their scores on the Vocabulary subtest; 2) Mathematics, Applications subtest, which was performed less well than the Computation and Concepts subtests; 3) Language, Expression subtest, where more students (in both grades) than expected scored below anticipated achievement and some performed behind the norm; and 4) Study Skills, Using Reference Materials subtest, where both grades performed behind the norm.

ANALYSIS OF VARIABLES

A table of correlation coefficients presented in Section IV reveals very little relationship at either grade between achievement and a vast majority of the variables studied. However, a few tentative conclusions relating to possible trends or tendencies are presented following the table. A similar analysis of any relationships of school characteristics to anticipated achievement was also made. Once again, little relationship was revealed. However, each variable is discussed in Section IV and noteworthy trends are identified.

Appendix A

EXAMPLE LETTER AND QUESTIONNAIRE TO LOCAL EDUCATION AGENCY CONTACT

To: LEA Contact
Name
Address

Enclosed you will find a copy of the data collection instrument for each school building, in your district, that is participating in the current Missouri Elementary Assessment Program.

As the individual identified to coordinate all aspects of the program within your district, one of your tasks is to see that these data sheets are properly completed, whether by you or by some other appropriate person, and returned to CTB/McGraw-Hill.

These data are as important to the outcome of the program as are the test data. Please exert every effort to ensure the accuracy and completeness of the entries on the form. Inaccurate data will simply invalidate some of the results; incomplete forms will incur the expense of personal contact to obtain the omitted data.

An additional copy is enclosed for you to bring to the Testing Workshop during the week of March 15-19. At that time, Mr. Anzo Manoni, CTB/McGraw-Hill Evaluation Consultant, will answer any questions you may have about the instrument.

Coordination of all aspects of the program in each local district is crucial. You are one of the 90 key people in this state-wide effort. Without your assistance this assessment would be literally impossible. Thank you for your participation and cooperation.

Sincerely,

James B. Cox
CTB/McGraw-Hill

JBC:ld

Encl.

Missouri Elementary Assessment Program

SCHOOL DATA

Person Completing Instrument

Name ______________________________

Title ______________________________

Telephone __________________________

City ______________________________

School Name ______________________

School Code ______________________

- -

1. All entries on this instrument must be directly related to the school building identified above.
2. All items must be completed.
3. The completed instrument is to be returned to CTB in the package of test answer sheets for Grade 4. (Unless only Grade 6 is being tested, then include instrument with answer sheets for Grade 6.)

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1. Guidance Service

How many counselors, certificated at the elementary level, are assigned full or part time to this building?

_______number of counselors

_______total assigned hours per week in this building for these counselors.

2. Health Service

How many registered nurses (RN's) are assigned full or part time to this building?

_______number of registered nurses

_______total assigned hours per week in this building for these nurses.

3. Library Service

How many certificated school librarians are assigned full or part time to this building?

_______number of librarians

_______total number of hours per week in this building for these librarians.

4. A-V Service

Is there a staff member, in this building, who is assigned to coordinate A-V services in this building?

Yes_______ No_______

If yes: _______number of hours per week

5. Social Worker Service

Does your school district employ social workers to whom students in this building may be referred?

Yes_______ No_______

If yes: _______number of district-employed social workers.

3

6. Psychological Service

Does your school district employ licensed psychologists to whom students in this building may be referred?

Yes_______ No_______

If yes: _______number of district-employed psychologists.

7. Title I Programs

Is there a Title I funded program in your district?

Yes_______ No_______

If yes: Is this building qualified according to Title I guidelines, as a Title I school?

Yes_______ No_______

If yes: Does this building participate in the Title I program of your district?

Yes_______ No_______

8. Special Teachers

Are students in the intermediate grades (4-6) in this building taught by special teachers who are certificated to teach in the areas of

Art:	_______Yes	_______No
Music:	_______Yes	_______No
Physical Education:	_______Yes	_______No

9. Special Education Program

Does your district have a Special Education program for those students in this building who are qualified for

EMR classes	_______Yes	_______No
Speech handicapped classes	_______Yes	_______No

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10. Kindergarten Program

For the children in the attendance area of this building, is there district-provided instruction for:

Check Yes or No in the appropriate column(s)		District Funded	Title I (or other) Funded
Pre-Kindergarten	Yes		
	No		
Kindergarten	Yes		
	No		

11. Instructional Organization

Which characteristics best identify the predominant instructional organization in this building? (Check one for Primary and check one for Intermediate.)

Primary (Grades 1-3)

_______Graded, self contained

_______Graded, departmentalized

_______Non-graded, self contained

_______Non-graded, departmentalized

Intermediate (Grades 4-6)

_______Graded, self contained

_______Graded, departmentalized

_______Non-graded, self contained

_______Non-graded, departmentalized

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12. Administrative Service

Based on a 30-hour in-school week, how many hours per week does the principal function solely (exclude teaching hours) in his role as principal in this building?

_______number of hours per week as principal in this building.

Does the principal in this building hold an elementary principal's certificate?

Yes_______ No_______

Is there a certificated elementary principal serving as an assistant principal in this building?

Yes_______ No_______

If yes: _______number of hours per week (exclude teaching hours) assigned as assistant principal within building.

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Appendix B

MEAN GRADE EQUIVALENTS AND STANDARD DEVIATIONS

Reading - Grade 4

	No. Items	N	Mean	SD	Norm Mean	Norm SD
Vocabulary	40				4.7	1.6
A		1133	4.8	1.6		
AA		912	5.0	1.6		
AAA		6086	4.9	1.6		
Comprehension	45				4.9	2.1
A		1133	5.0	2.1		
AA		912	5.1	2.1		
AAA		6083	4.9	2.0		
Total	85				4.8	1.8
A		1132	4.8	1.7		
AA		912	5.0	1.7		
AAA		6073	4.9	1.7		

Appendix C

ANTICIPATED ACHIEVEMENT DATA - GRADE EQUIVALENTS

Reading - Grades 4 and 6

		Grade 4		Grade 6	
		Anticipated	Obtained	Anticipated	Obtained
A	Voc	4.6	4.8	6.5	6.6
	Comp	4.8	5.0	6.6	6.6
	Tot	4.8	4.9	6.5	6.6
AA	Voc	4.8	5.0	6.8	6.8
	Comp	5.0	5.1	7.0	6.8
	Tot	4.9	5.0	6.8	6.7
AAA	Voc	4.8	5.0	6.7	6.9
	Comp	4.9	5.0	6.9	6.8
	Tot	4.8	4.9	6.7	6.8
All Schools	Voc	4.8	5.0	6.7	6.8
	Comp	4.9	5.0	6.8	6.8
	Tot	4.8	4.9	6.7	6.8
Norm Group	Voc		4.7		6.6
	Comp		4.9		6.8
	Tot		4.8		6.7

N = Grade 4: A, 1105; AA, 890; AAA, 5878; All Schools, 7873.

N = Grade 6: A, 1158; AA, 952; AAA, 5985; All Schools, 8095.

Appendix D

PERCENTAGES OF STUDENTS SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 4 - Reading

District Classification		Vocabulary	Comprehension	Total
A	Above	10	9	11
N = 1084	Below	5	11	7
AA	Above	11	10	10
N = 873	Below	5	8	6
AAA	Above	11	9	10
N = 5704	Below	4	10	8
All	Above	11	9	10
Schools	Below	4	10	8
N = 7661				
Norm	Above	10	10	10
Group	Below	10	10	10

Appendix E

MEAN GRADE EQUIVALENTS AND STANDARD DEVIATIONS

Reading - Grade 6

	No. Items	N	Mean	SD	Norm Mean	Norm SD
Vocabulary	40				6.6	2.2
A		1179	6.6	2.0		
AA		973	6.8	1.9		
AAA		6158	6.8	2.0		
Comprehension	45				6.8	2.6
A		1181	6.6	2.5		
AA		972	6.8	2.5		
AAA		6159	6.8	2.5		
Total	85				6.7	2.3
A		1179	6.6	2.1		
AA		972	6.7	2.1		
AAA		6154	6.8	2.1		

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Appendix F

PERCENTAGES OF STUDENTS SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 6 - Reading

District Classification		Vocabulary	Comprehension	Total
A N = 1145	Above Below	15 11	12 12	13 12
AA N = 940	Above Below	11 10	11 13	10 11
AAA N = 5826	Above Below	15 9	11 12	13 10
All Schools N = 7911	Above Below	15 9	11 13	12 11
Norm Group	Above Below	10 10	10 10	10 10

Appendix G

MEAN GRADE EQUIVALENTS AND STANDARD DEVIATIONS

Mathematics - Grade 4

	No. Items	N	Mean	SD	Norm Mean	Norm SD
Computation	48				4.6	1.0
A		1125	5.0	1.1		
AA		900	5.0	1.1		
AAA		6074	4.8	1.1		
Concepts	30				4.7	1.6
A		1125	5.0	1.7		
AA		899	5.2	1.7		
AAA		6055	5.0	1.7		
Applications	20				4.7	1.7
A		1123	4.8	1.9		
AA		898	4.9	1.8		
AAA		6028	4.8	1.8		
Total	98				4.6	1.2
A		1123	5.0	1.3		
AA		897	5.0	1.3		
AAA		6014	4.8	1.3		

Appendix H

ANTICIPATED ACHIEVEMENT DATA - GRADE EQUIVALENTS

Mathematics - Grades 4 and 6

		Grade 4		Grade 6	
		Anticipated	Obtained	Anticipated	Obtained
A	Comp	4.6	5.0	6.6	6.8
	Conc	4.7	5.0	6.4	6.5
	Applic	4.6	4.8	6.6	6.7
	Tot	4.7	5.0	6.5	6.6
AA	Comp	4.7	5.0	6.7	6.9
	Conc	4.8	5.2	6.5	6.8
	Applic	4.7	5.0	6.8	7.1
	Tot	4.7	5.0	6.7	6.9
AAA	Comp	4.6	4.8	6.8	6.6
	Conc	4.7	5.0	6.5	6.7
	Applic	4.7	4.8	6.8	6.8
	Tot	4.7	4.9	6.7	6.7
All Schools	Comp	4.6	4.9	6.8	6.7
	Conc	4.7	5.0	6.5	6.7
	Applic	4.6	4.8	6.8	6.8
	Tot	4.7	4.9	6.7	6.7
Norm Group Means	Comp		4.6		6.7
	Con		4.7		6.5
	Applic		4.7		6.8
	Tot		4.6		6.6

N = Grade 4: A, 1094; AA, 876; AAA, 5806; All Schools, 7776.

N = Grade 6: A, 1157; AA, 951; AAA, 5918; All Schools, 8026.

Appendix I

PERCENTAGES OF STUDENTS SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 4 - Mathematics

District Classification		Computation	Concepts	Applications	Total
A	Above	24	12	12	16
N = 1084	Below	6	7	9	6
AA	Above	21	14	13	19
N = 873	Below	6	4	8	5
AAA	Above	17	13	10	15
N = 5704	Below	8	6	10	6
All	Above	18	13	11	16
Schools	Below	8	6	10	6
N = 7661					
Norm	Above	10	10	10	10
Group	Below	10	10	10	10

Appendix J

MEAN GRADE EQUIVALENTS AND STANDARD DEVIATIONS

Mathematics - Grade 6

	No. Items	N	Mean	SD	Norm Mean	Norm SD
Computation	48				6.7	1.8
A		1183	6.8	1.6		
AA		970	6.9	1.6		
AAA		6126	6.6	1.6		
Concepts	30				6.5	2.0
A		1185	6.5	1.8		
AA		970	6.8	1.8		
AAA		6124	6.7	1.8		
Applications	20				6.8	2.4
A		1185	6.7	2.3		
AA		970	7.1	2.2		
AAA		6123	6.8	2.3		
Total	98				6.6	1.8
A		1183	6.6	1.6		
AA		969	6.9	1.6		
AAA		6114	6.6	1.7		

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Appendix K

PERCENTAGES OF STUDENTS SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 6 - Mathematics

District Classification		Computation	Concepts	Applications	Total
A	Above	13	12	11	10
N = 1145	Below	7	6	12	9
AA	Above	14	15	13	14
N = 940	Below	7	7	7	8
AAA	Above	9	13	10	9
N = 5826	Below	13	7	12	11
All	Above	10	13	11	10
Schools	Below	11	7	11	10
N = 7911					
Norm	Above	10	10	10	10
Group	Below	10	10	10	10

Appendix L

MEAN GRADE EQUIVALENTS AND STANDARD DEVIATIONS

Language - Grade 4

	No. Items	N	Mean	SD	Norm Mean	Norm SD
Mechanics	25				5.0	2.1
A		1130	5.1	2.2		
AA		911	5.1	2.1		
AAA		6076	5.0	2.1		
Expression	30				4.9	2.2
A		1129	4.9	2.3		
AA		911	5.0	2.2		
AAA		6048	5.0	2.3		
Spelling	30				4.7	1.8
A		1130	4.9	1.9		
AA		911	5.0	1.9		
AAA		6065	5.0	1.9		
Total	85				4.8	1.8
A		1129	4.9	1.8		
AA		911	4.9	1.7		
AAA		6036	4.9	1.8		

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Appendix M

ANTICIPATED ACHIEVEMENT DATA - GRADE EQUIVALENTS

Mathematics - Grades 4 and 6

		Grade 4		Grade 6	
		Anticipated	Obtained	Anticipated	Obtained
A	Mech	4.7	5.1	6.7	7.2
	Exp	4.9	5.0	6.6	6.6
	Spell	4.7	5.0	6.5	6.8
	Tot	4.7	4.9	6.5	6.7
AA	Mech	4.9	5.1	7.0	7.1
	Exp	5.0	5.0	7.0	6.9
	Spell	4.7	5.0	6.9	7.0
	Tot	4.9	4.9	6.8	6.8
AAA	Mech	4.8	5.0	7.1	7.2
	Exp	4.9	5.0	6.9	7.0
	Spell	4.7	5.0	6.9	7.0
	Tot	4.8	4.9	6.8	6.9
All Schools	Mech	4.8	5.1	7.1	7.2
	Exp	4.9	5.0	6.9	7.0
	Spell	4.7	5.0	6.8	7.0
	Tot	4.8	4.9	6.8	6.9
Norm Group Means	Mech		5.0		7.1
	Exp		4.9		6.9
	Spell		4.7		6.8
	Tot		4.8		6.8

N = Grade 4: A, 1103; AA, 889; AAA, 5853; All Schools, 7845.

N = Grade 6: A, 1159; AA, 951; AAA, 5965; All Schools, 8075.

Appendix N

PERCENTAGES OF STUDENTS SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 4 - Language

District Classification		Mechanics	Expression	Spelling	Total
A N = 1084	Above Below	13 11	12 12	14 8	15 12
AA N = 873	Above Below	12 10	10 13	15 11	13 16
AAA N = 5704	Above Below	12 11	12 13	15 9	14 13
All Schools N = 7661	Above Below	12 11	12 13	15 9	14 13
Norm Group	Above Below	10 10	10 10	10 10	10 10

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Appendix O

MEAN GRADE EQUIVALENTS AND STANDARD DEVIATIONS

Language - Grade 6

	No. Items	N	Mean	SD	Norm Mean	Norm SD
Mechanics	25				7.1	2.8
A		1180	7.2	2.6		
AA		971	7.1	2.5		
AAA		6151	7.2	2.6		
Expression	30				6.9	2.8
A		1180	6.6	2.7		
AA		970	6.9	2.7		
AAA		6152	7.0	2.7		
Spelling	30				6.8	2.4
A		1180	6.8	2.3		
AA		974	6.9	2.3		
AAA		6150	7.0	2.3		
Total	85				6.8	2.4
A		1180	6.7	2.2		
AA		970	6.8	2.2		
AAA		6142	6.9	2.2		

Appendix P

PERCENTAGES OF STUDENTS SIGNIFICANTLY ABOVE AND BELOW ANTICIPATED ACHIEVEMENT

Grade 6 - Language

District Classification		Mechanics	Expression	Spelling	Total
A N = 1145	Above Below	18 10	10 14	16 13	18 13
AA N = 940	Above Below	14 15	11 16	16 15	16 17
AAA N = 5826	Above Below	14 13	13 12	16 14	17 15
All Schools N = 7911	Above Below	14 14	12 13	16 14	17 15
Norm Group	Above Below	10 10	10 10	10 10	10 10